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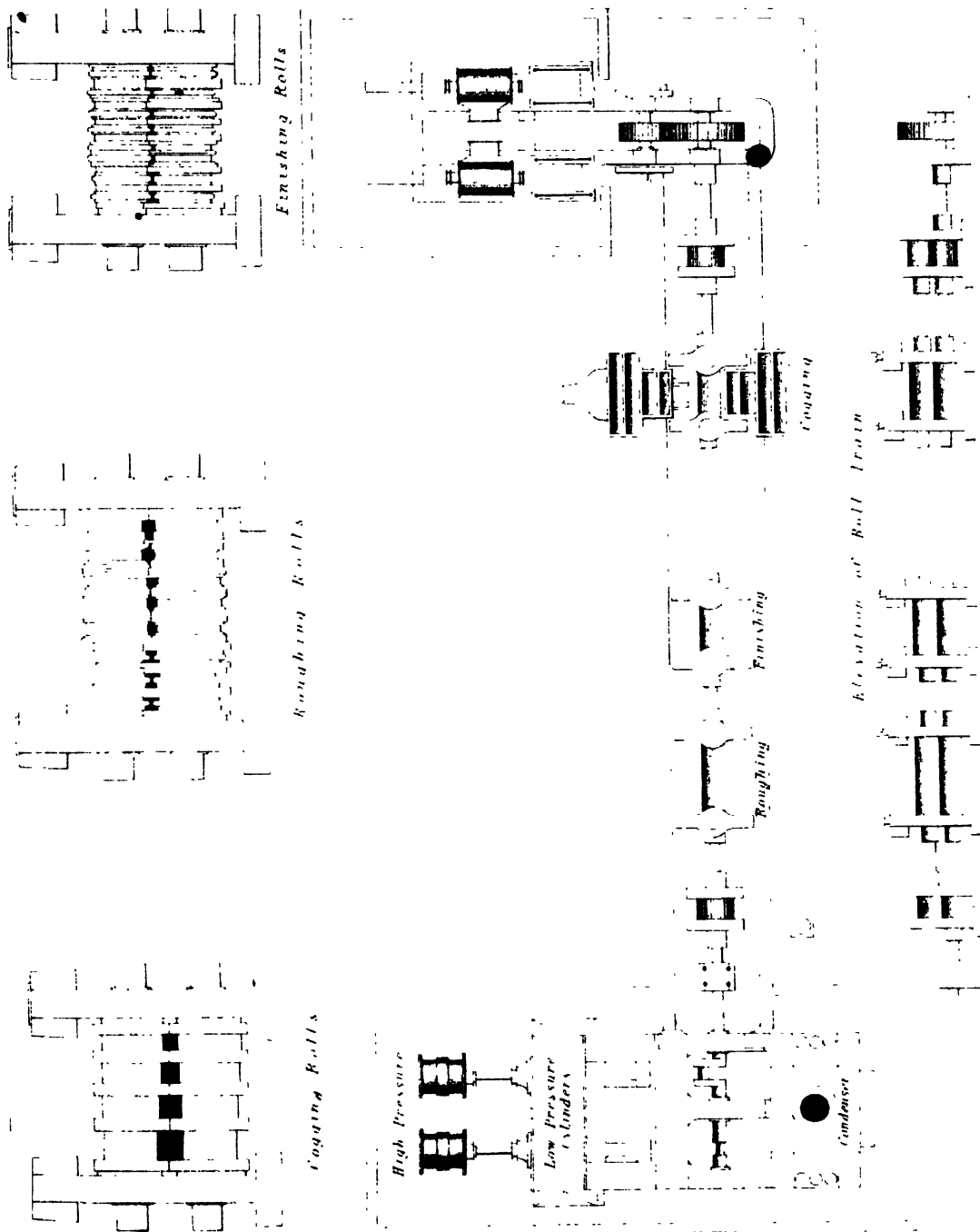
VOLUME VIII.

LONDON,

WILLIAM MACKENZIE, 69 LUDGATE HILL, F.C.

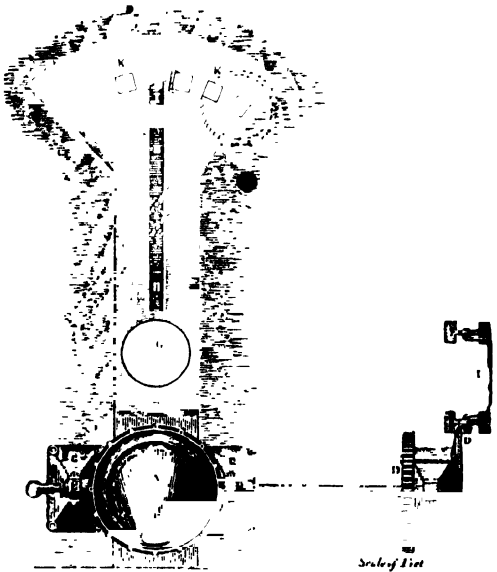
EDINBURGH, AND GLASGOW

PLAN AND ELEVATION OF ROLLING MILL

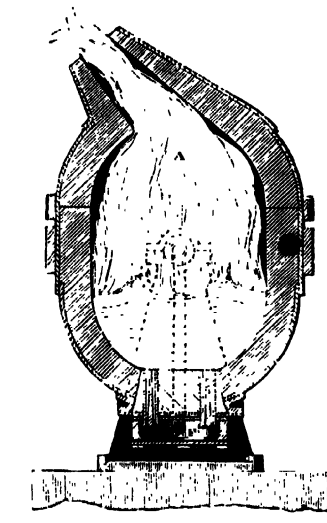


IRON.

(BESSEMER PROCESS.)



1. Plan.



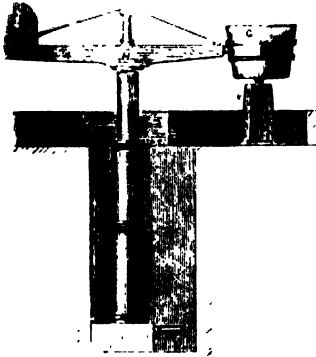
2. Section of Converting Vessel.



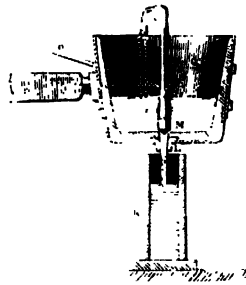
3. Plan of Tugere Box.



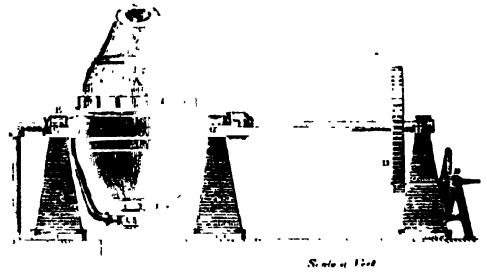
4. Vertical and Horizontal Section of Tugere



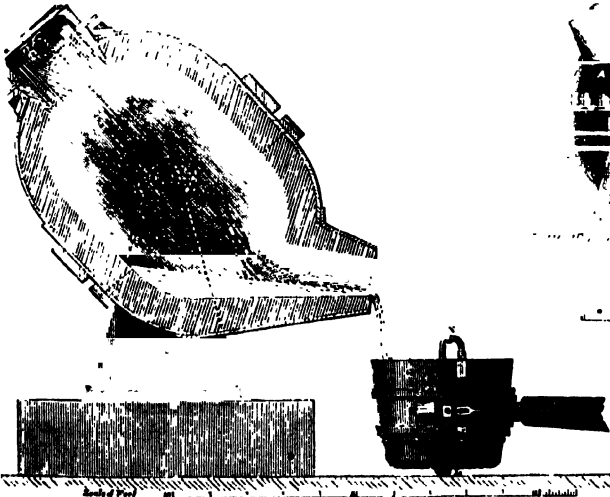
5. Side View of Hydraulic Crane Raised.



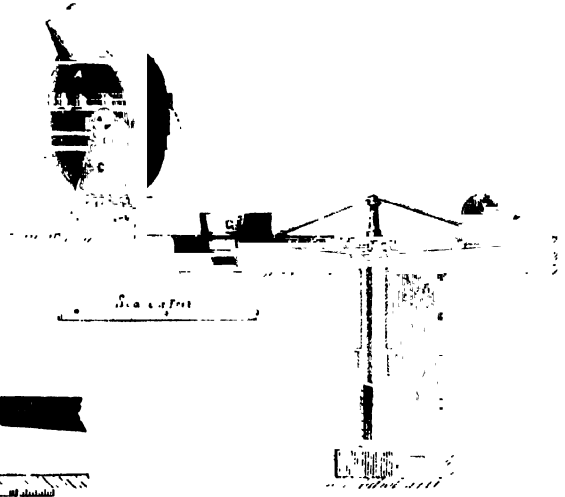
6. Section of Ladle and Hot Mould.



7. Front Elevation.



8. Section of Vessel, Side View of Ladle.



9. Side Elevation, partly in Section.

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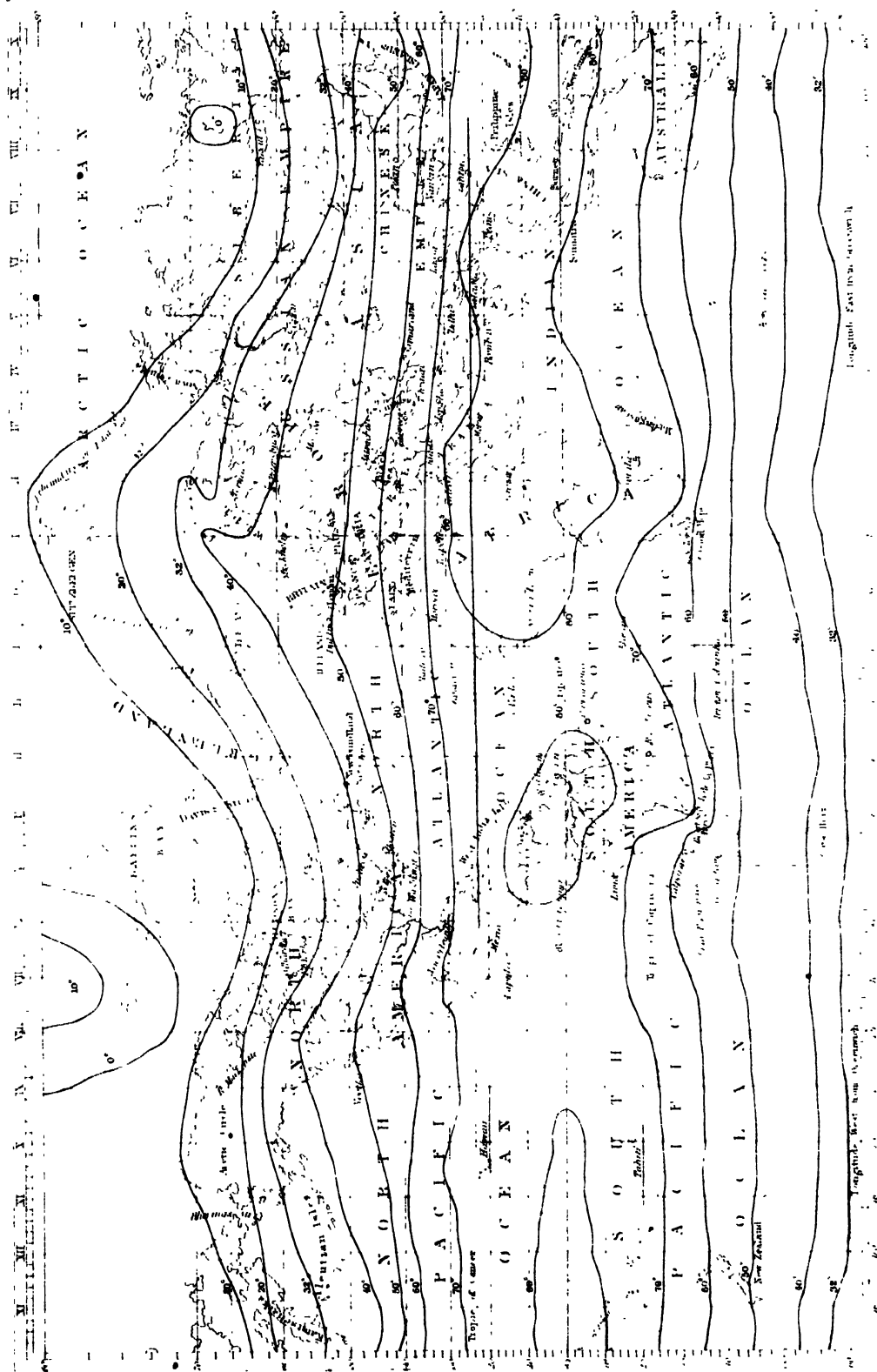
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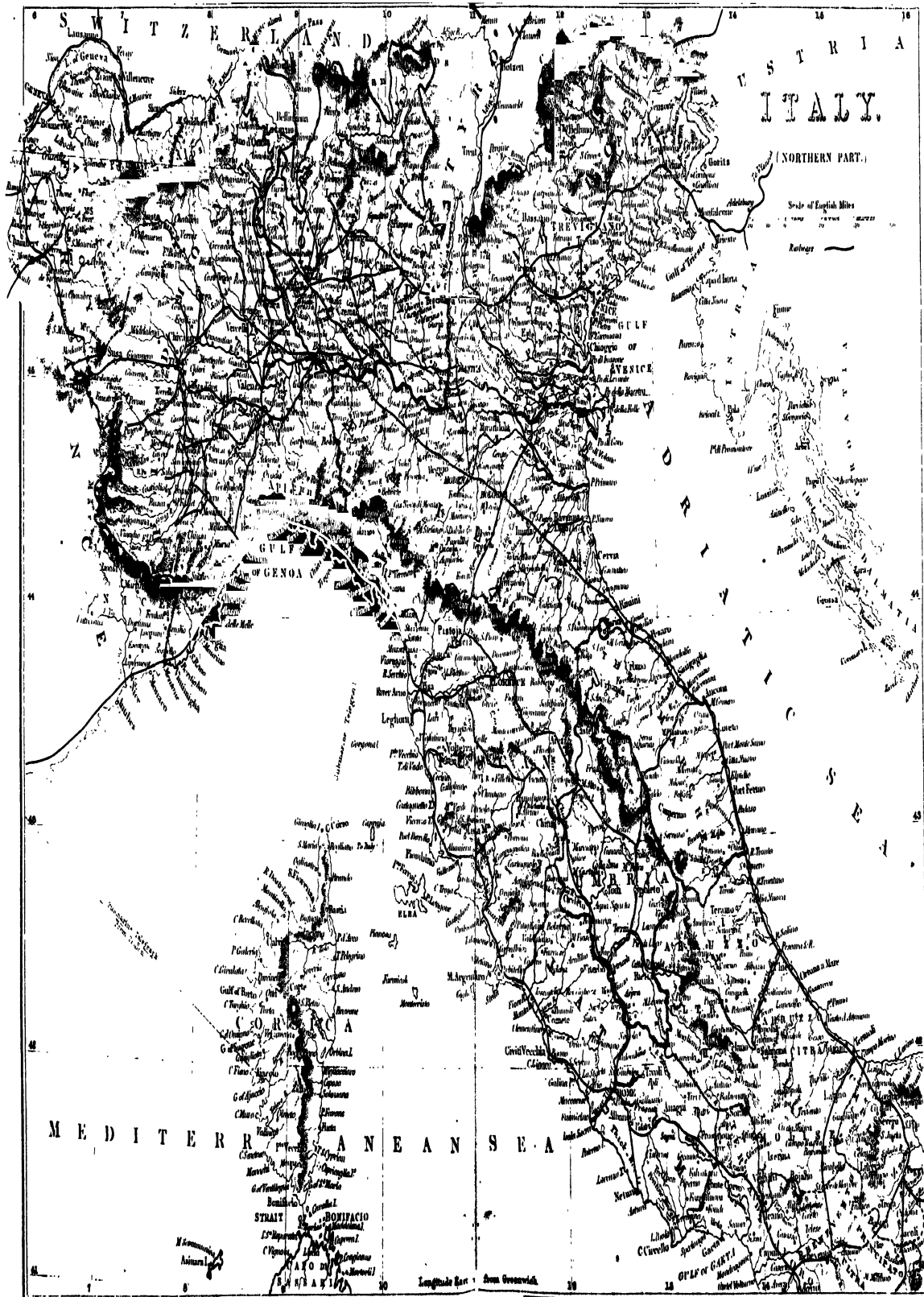
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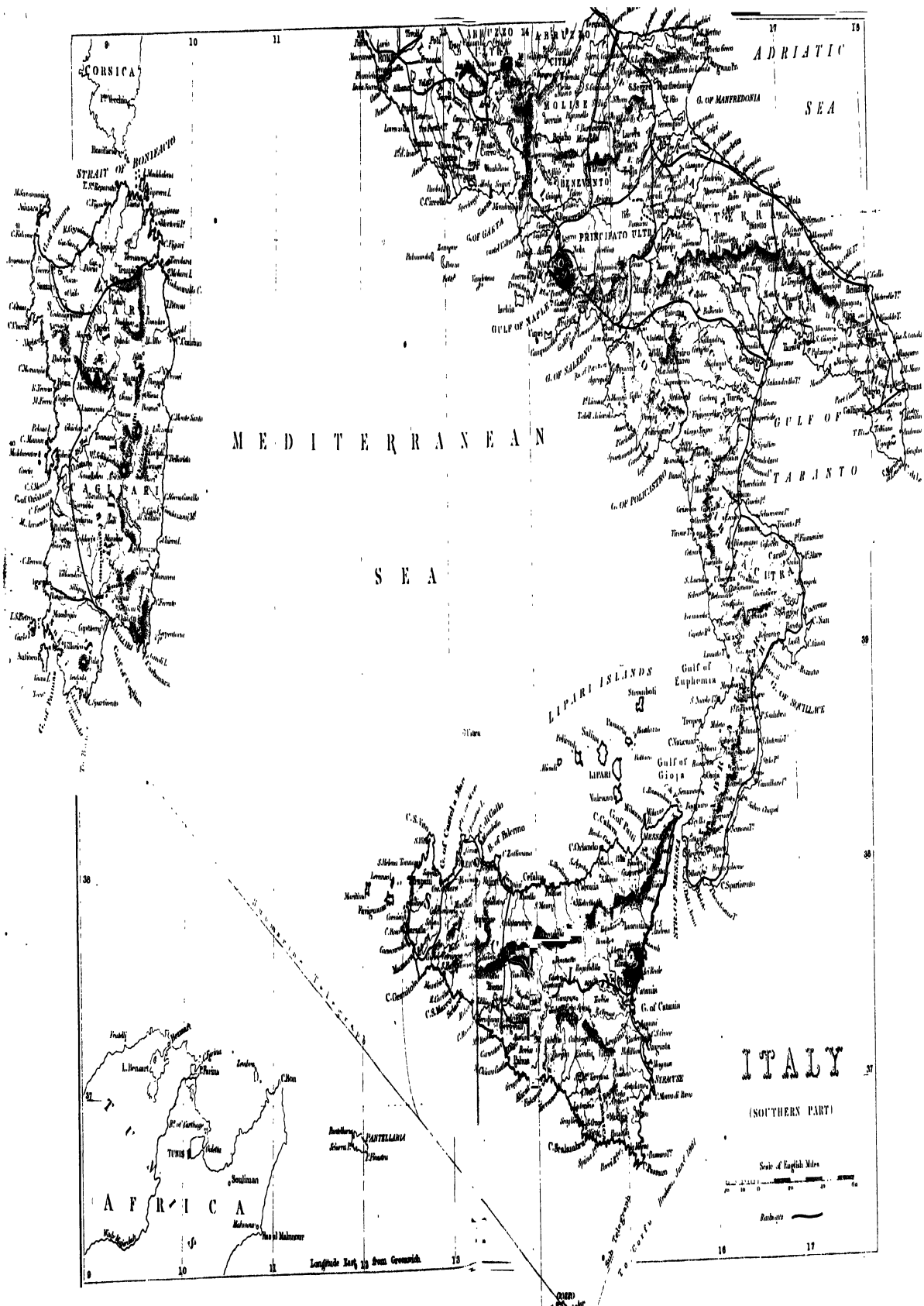
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(SHOWING MEAN TEMPERATURE OF THE YEAR)









1. *Arca nana*



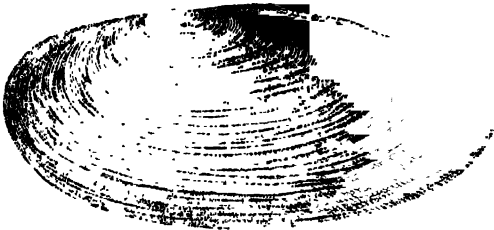
2. *Yoldia lanceolata*



3. *Trigonia pectinata*



4. *Mytilus edulis*
Sea mussel



5. *Anodonta imbecilis* Swan mussel



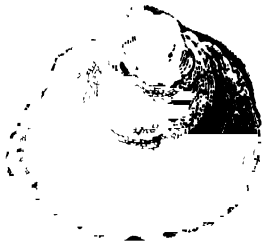
6. *Iridina ovata*



7. *Aberea cuticularia*



8. *Margarita margaritana* Pearl oyster



10. *Ostrea edulis* Oyster



9. *Pinna squamosa*



12. *Pecten jacobus* Scallop.



11. *Spondylus regius*



13. *Lima aperta*

LAMELLIBRANCHIATA. (SIPHONIATA)

PLATE 2.



14 *Chama lazarus*



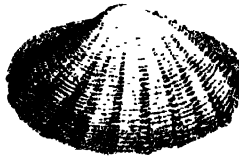
15. *Tridacna crocea*.—Clam.



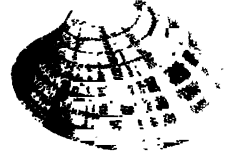
16 *Cardium hians* Cockle



17 *Solenomya mediterranea*



18 *Corbis limbrata*



19 *Cytherea chion*



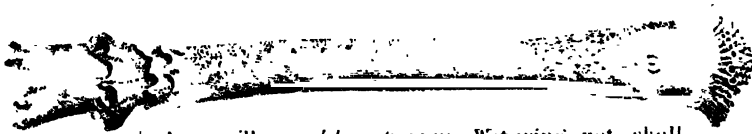
20. *Tellina radiata*



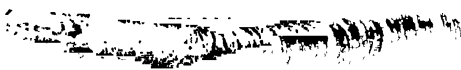
21 *Macræa stultorum*



22 *Mya arenaria*



23 *Aspergillum desertanum*—Watering pot shell



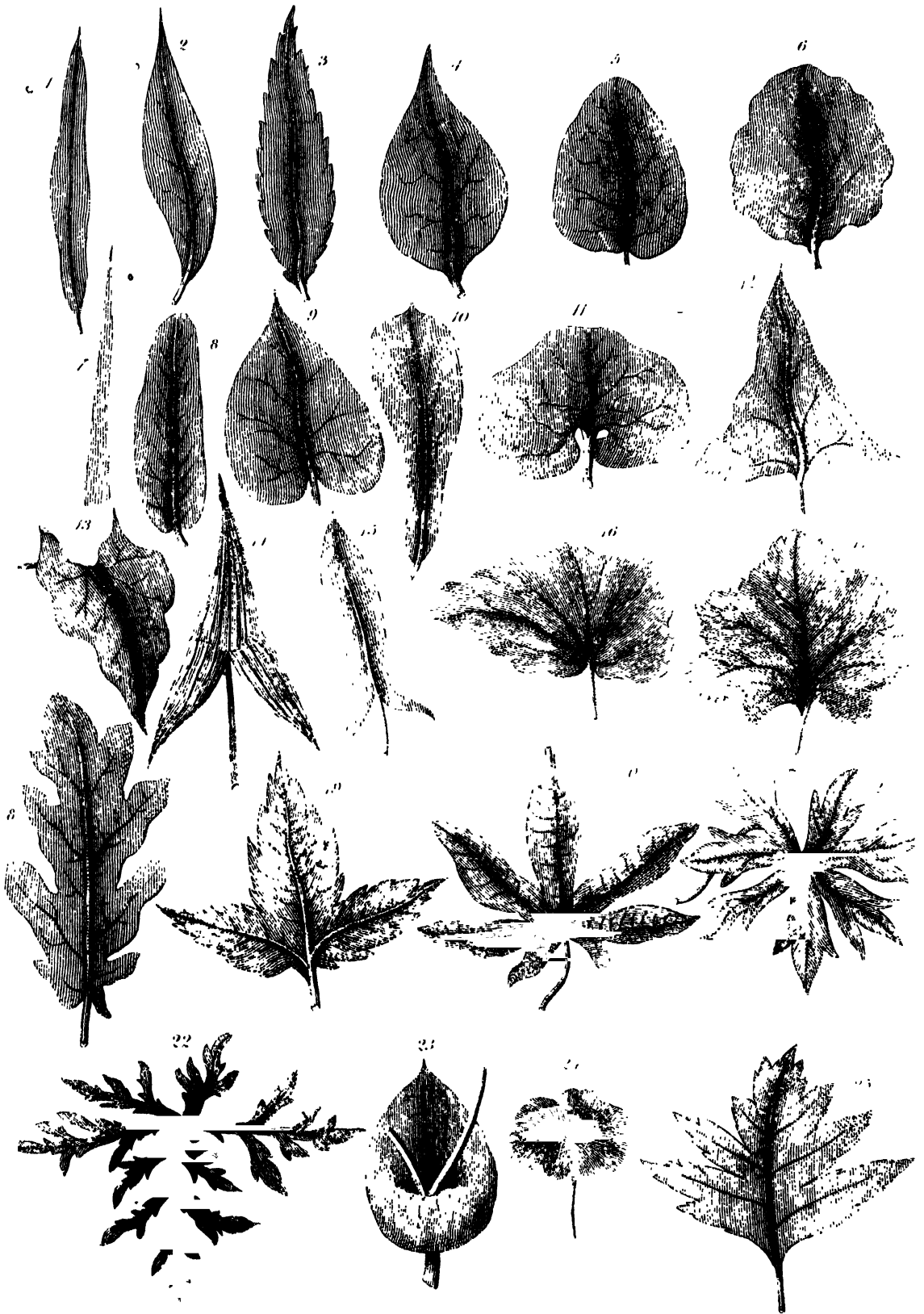
24 *Solen ensis*.—Razor shell.



25. *Pholas dactylus*

LEAF

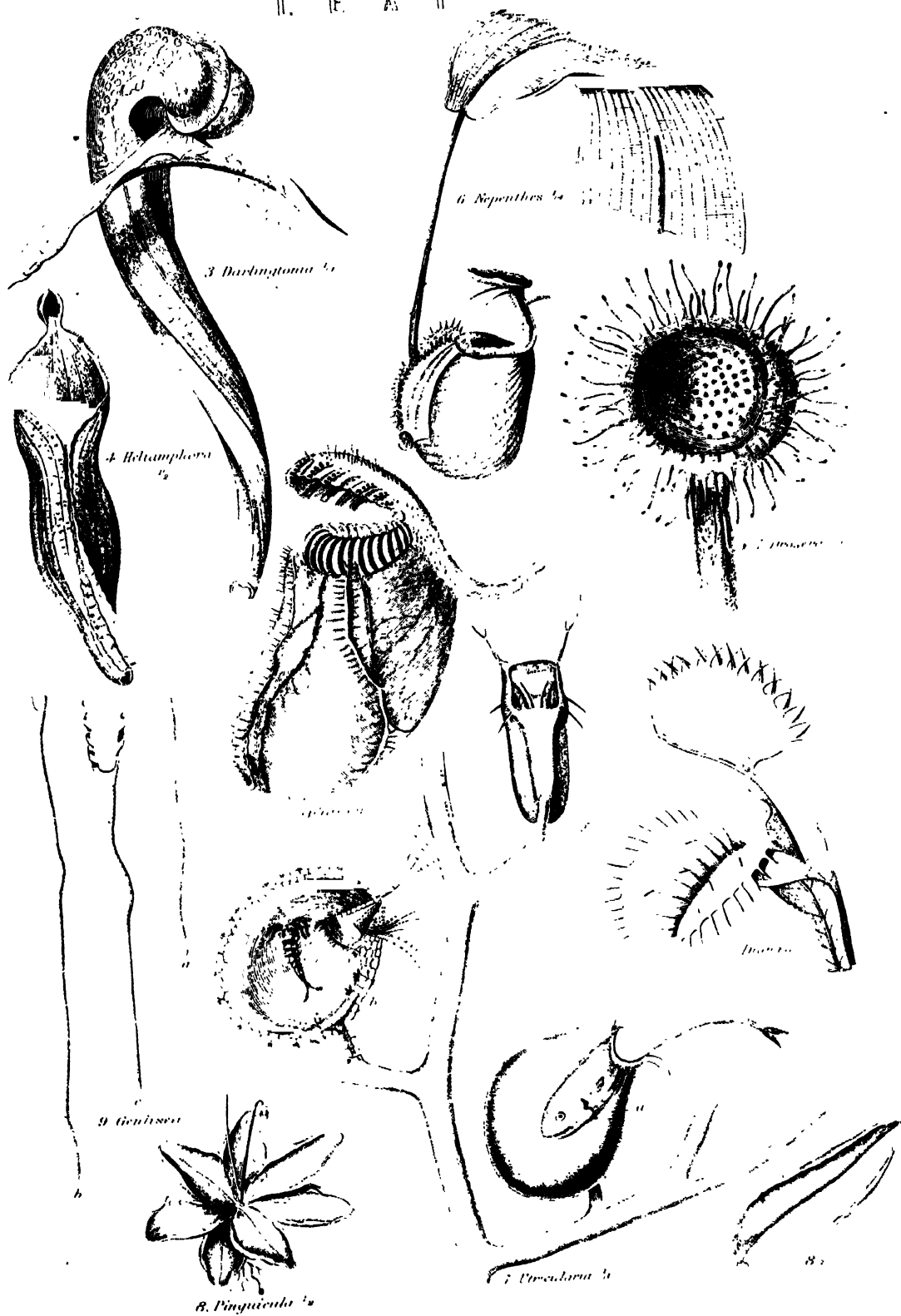
PLATE 1

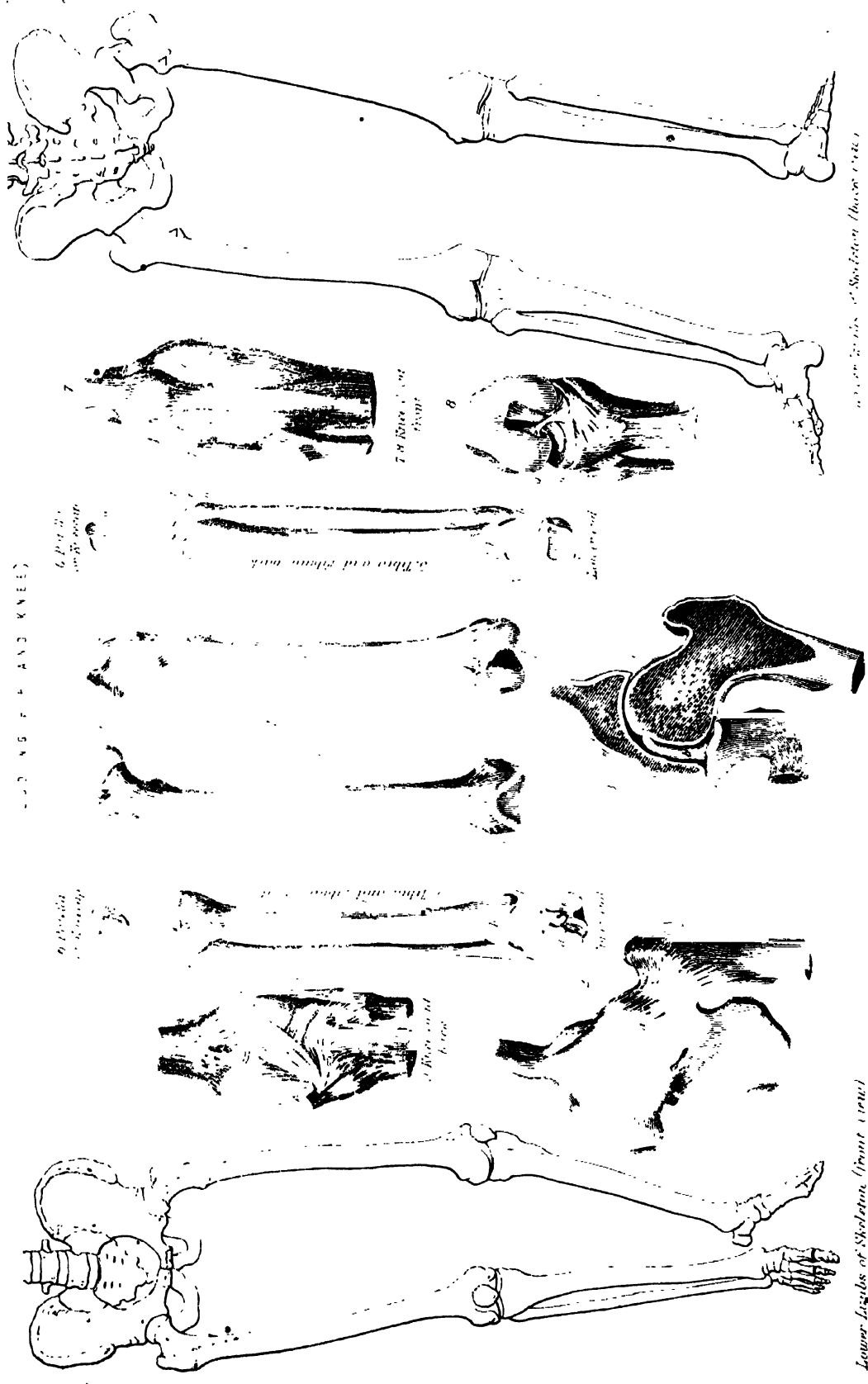


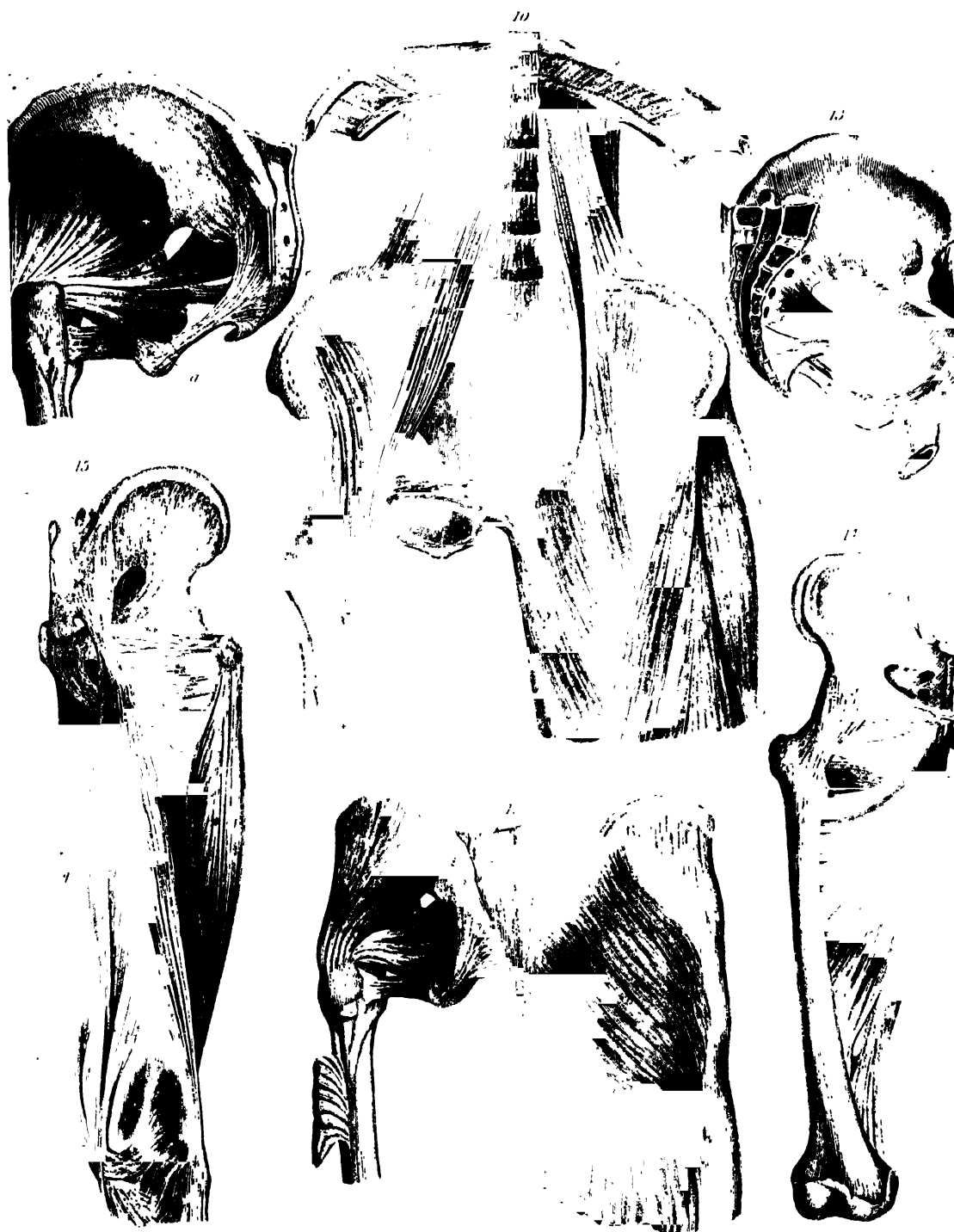
L E A F .
COMPOUND LEAVES

PLATE 2









LEGS (INCLUDING HIP AND KNEE)

Fig. 19.



General view
of the leg muscles
from before.

Fig. 18.



Fig. 17.



Fig. 16.



Fig. 19 a b The ilio-tibial band c femur d quadriceps femoris e vastus medialis f vastus lateralis g tensor of the popliteus h gastrocnemius i soleus j peroneus longus k peroneus brevis l tibia m fibula n calcaneus o plantar fascia p tarsal tunnel q saphenous nerve r saphenous vein s saphenous artery t saphenous vein u saphenous artery v saphenous vein w saphenous artery x saphenous vein y saphenous artery z saphenous vein

Fig. 20 a b The ilio-tibial band c femur d quadriceps femoris e vastus medialis f vastus lateralis g tensor of the popliteus h gastrocnemius i soleus j peroneus longus k peroneus brevis l tibia m fibula n calcaneus o plantar fascia p tarsal tunnel q saphenous nerve r saphenous vein s saphenous artery t saphenous vein u saphenous artery x saphenous vein y saphenous artery z saphenous vein

Fig. 20.



General view
of the leg muscles
from behind.

LEMURIDÆ.



Lemur catta Ring-tailed Lemur



Indris brevicaudatus Indris



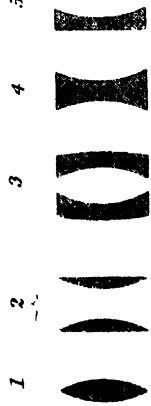
Loris gracilis Slender Loris
or Slow Lemur



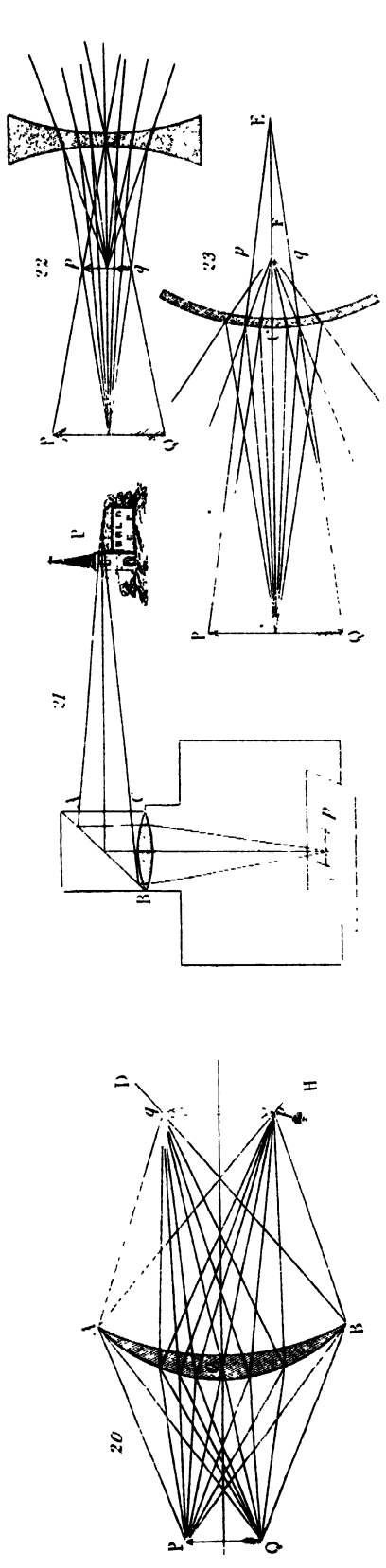
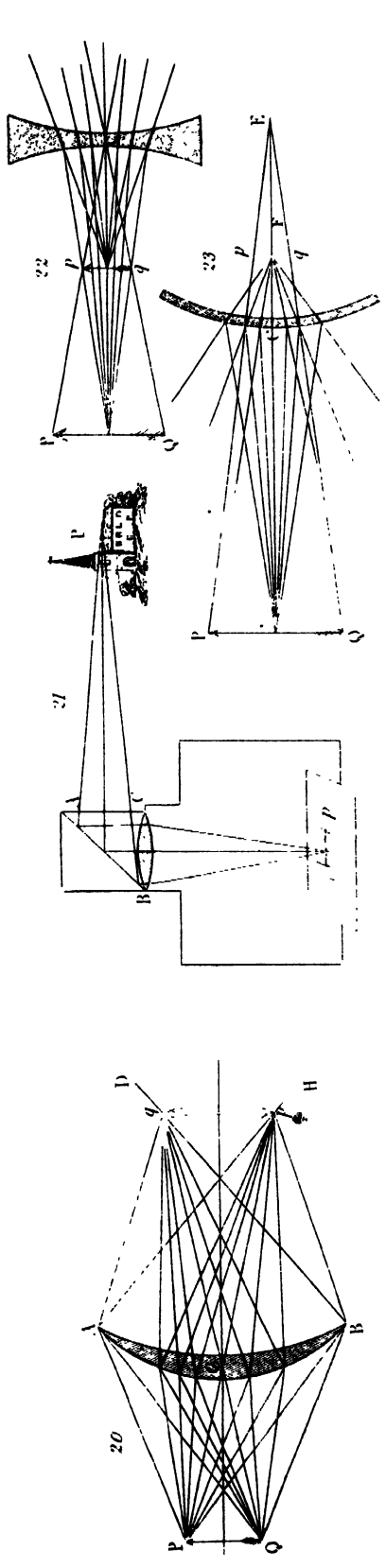
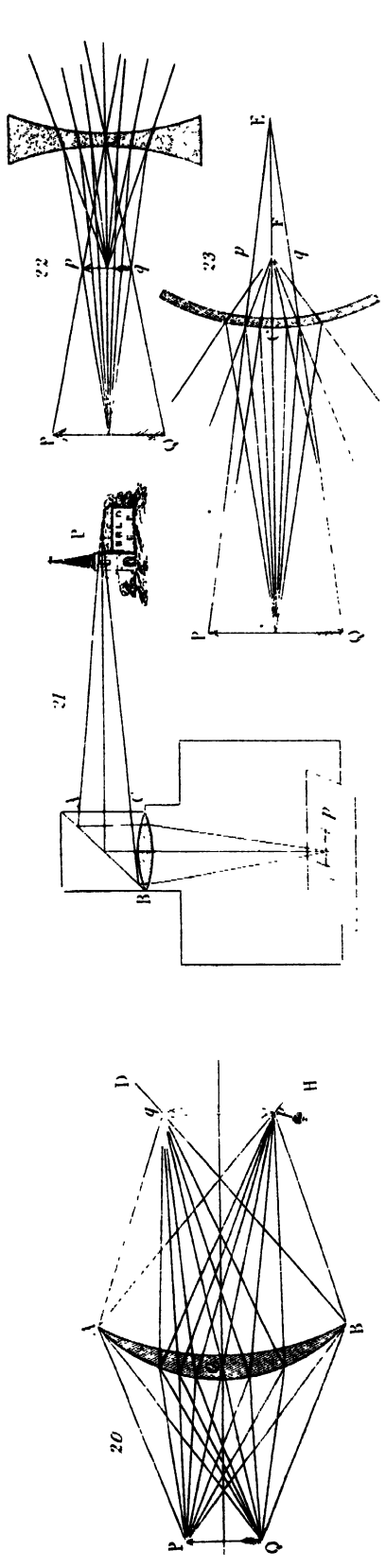
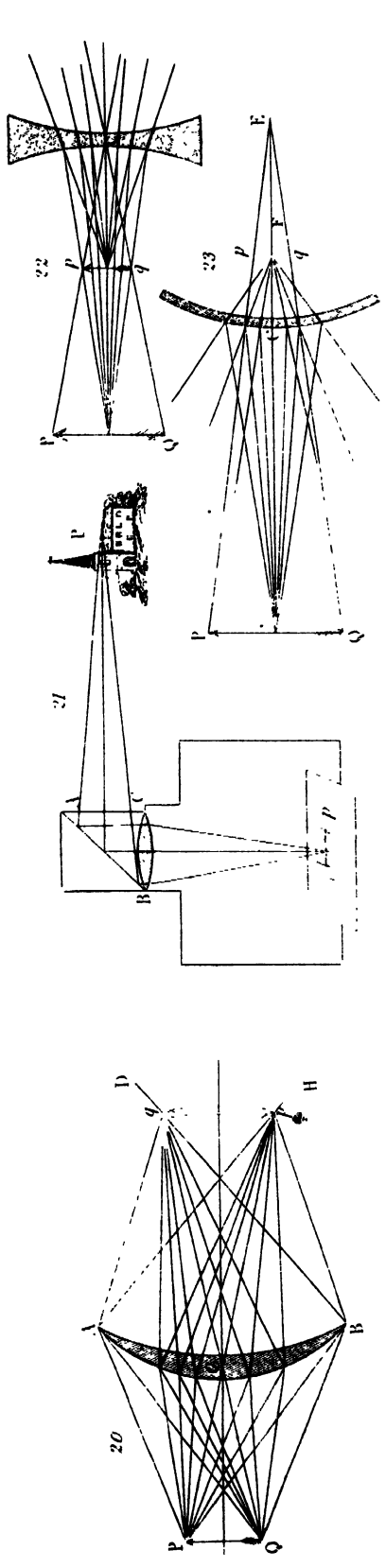
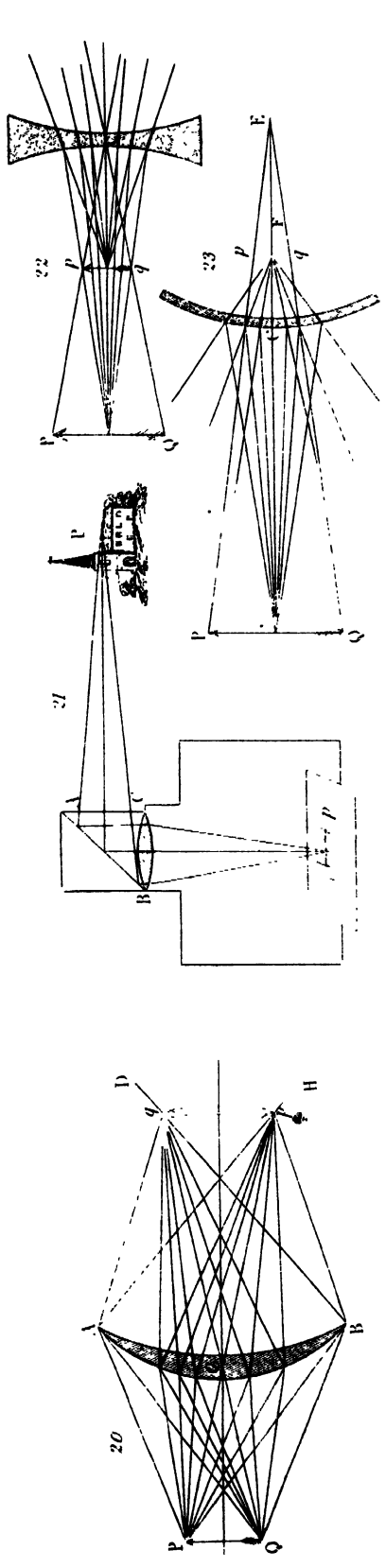
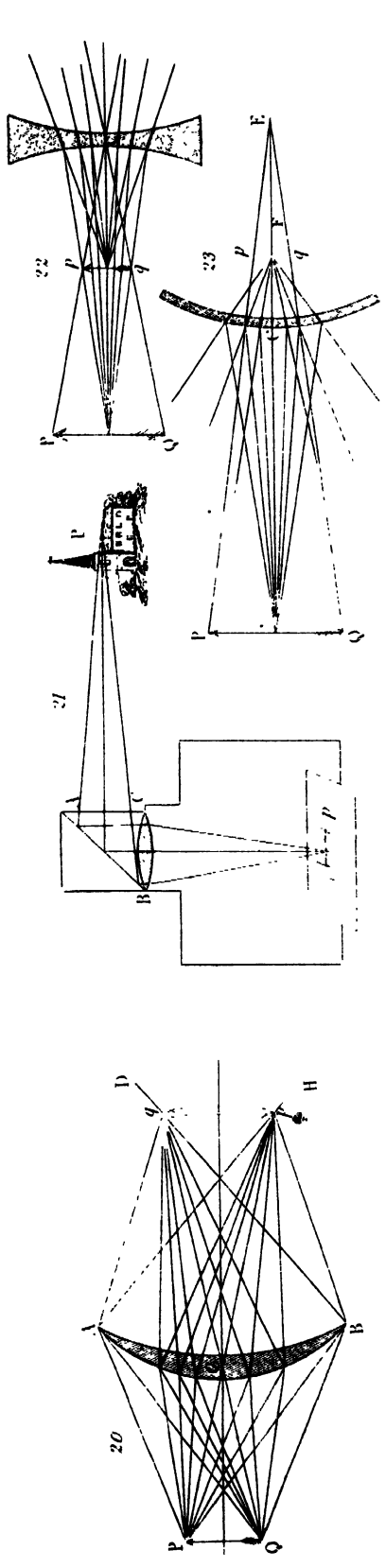
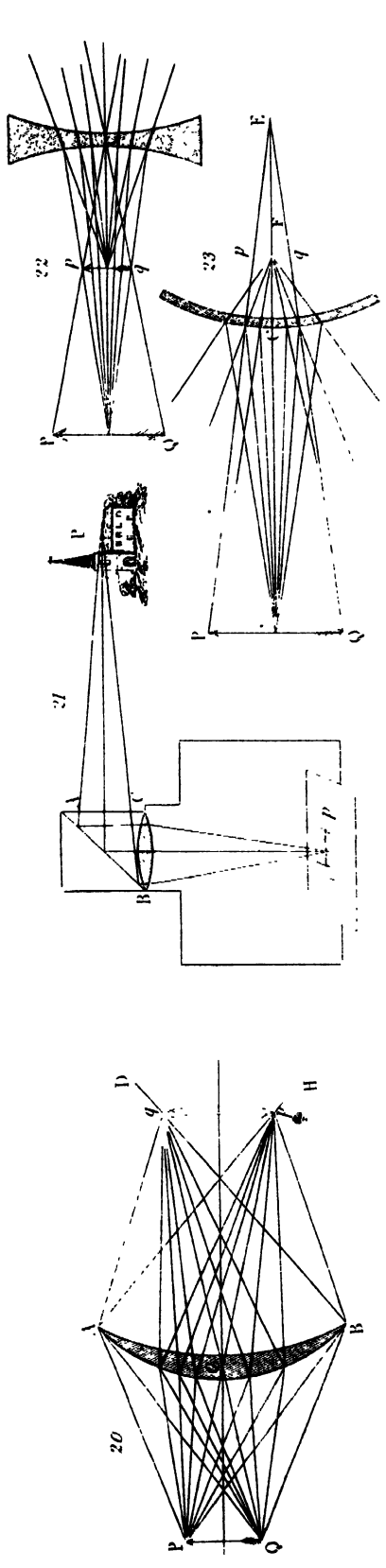
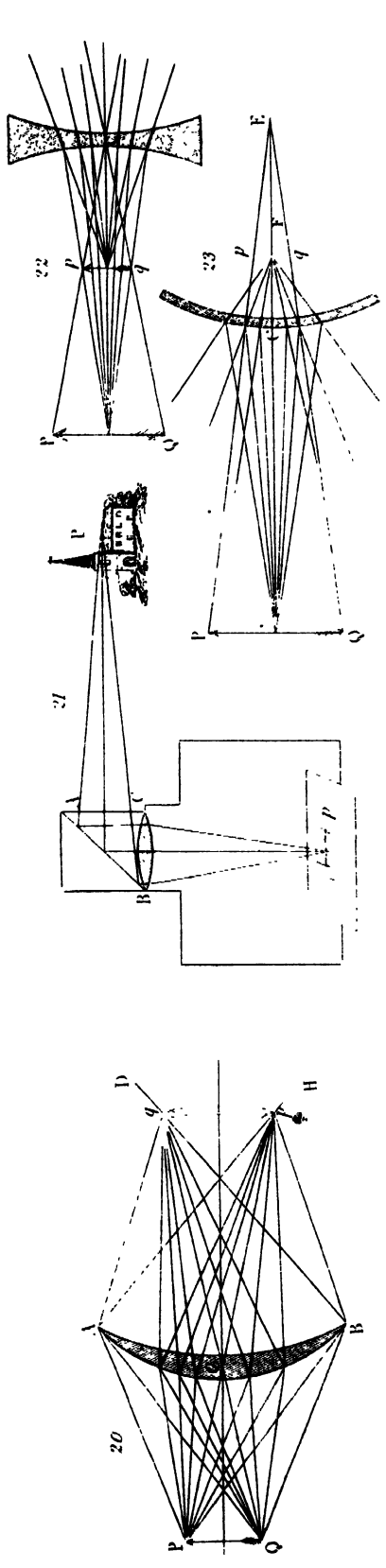
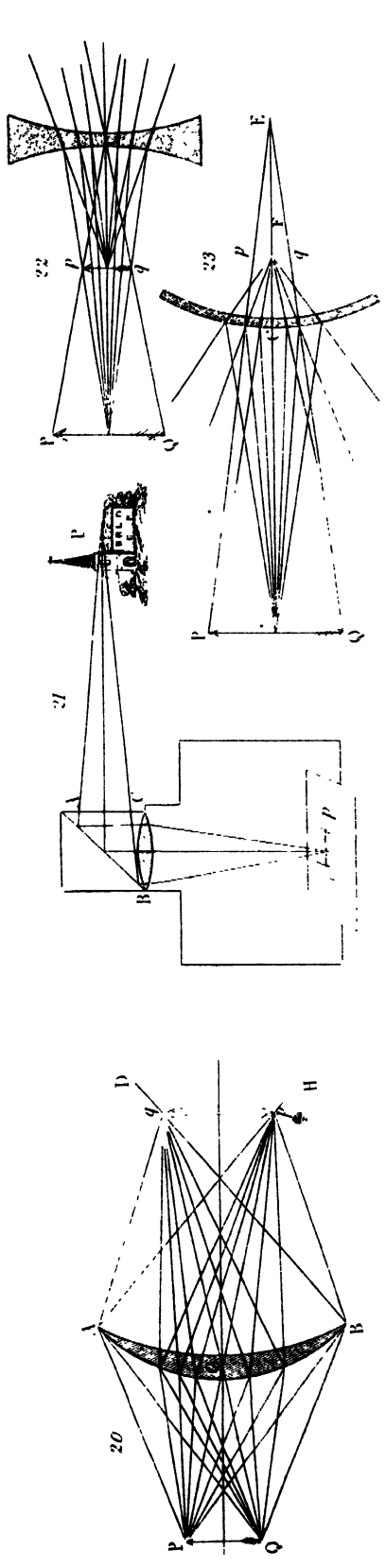
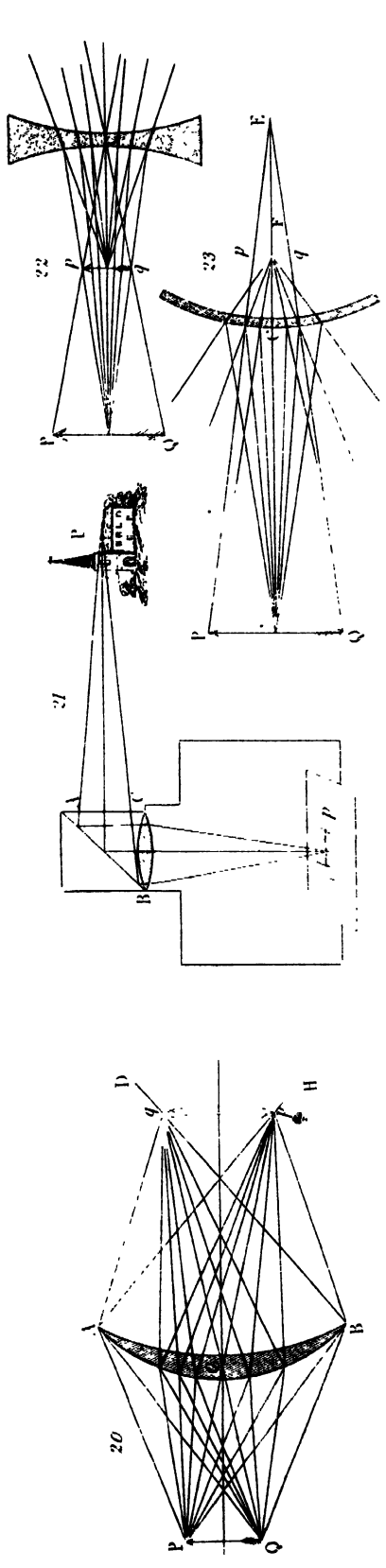
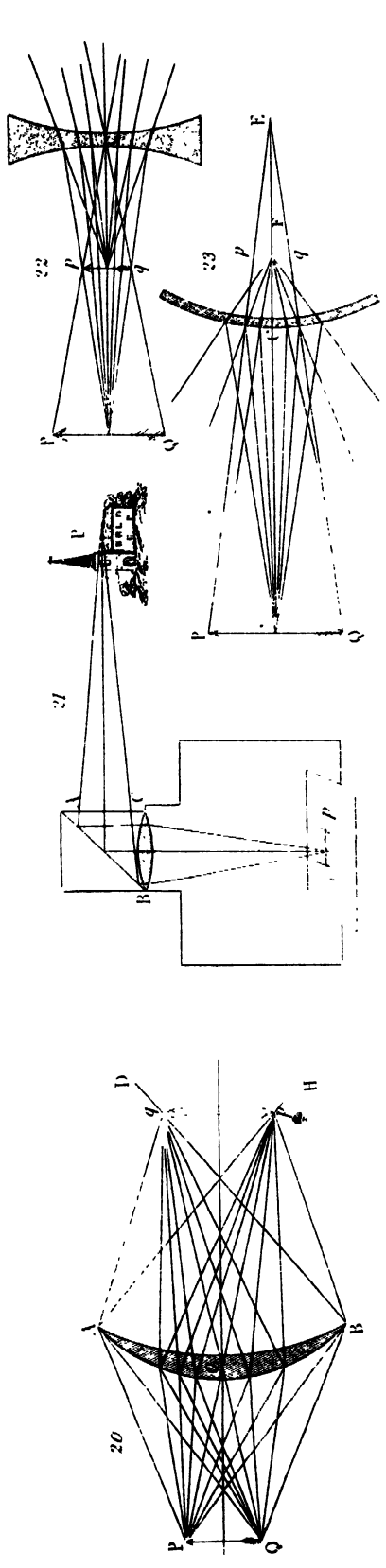
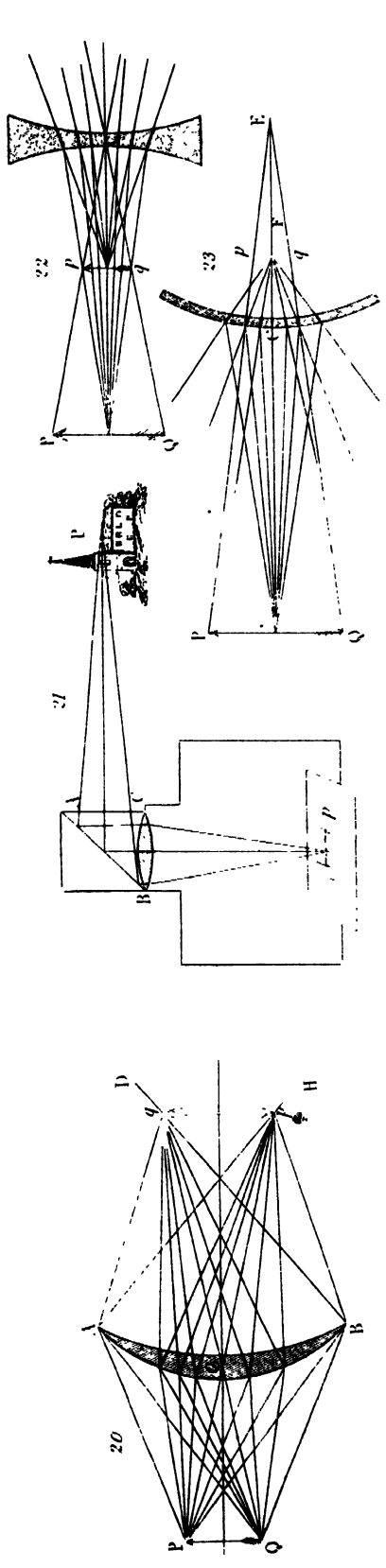
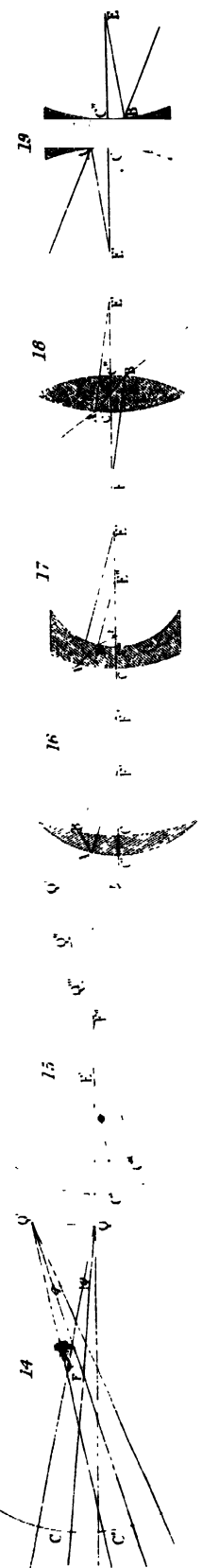
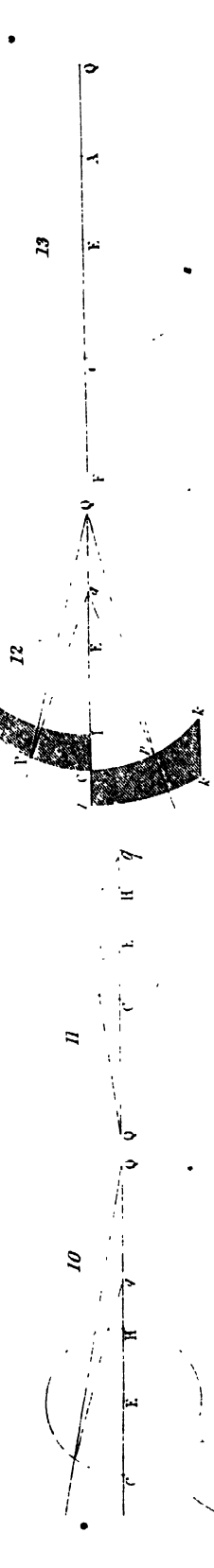
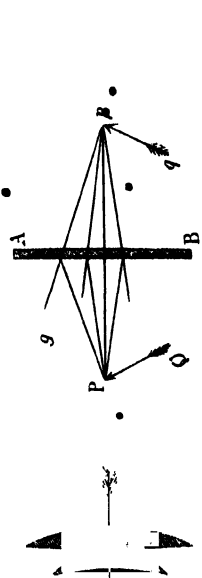
Galago senegalensis Senegal Galago



Tarsius spectrum Tarsier

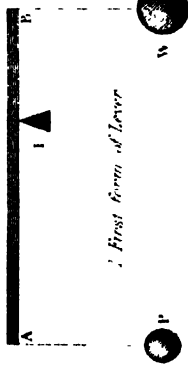


Forms of Lenses

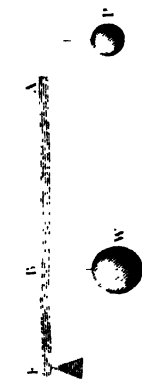


THE WHEEL AND AXLE

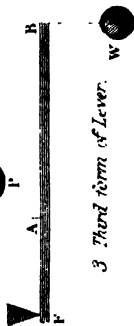
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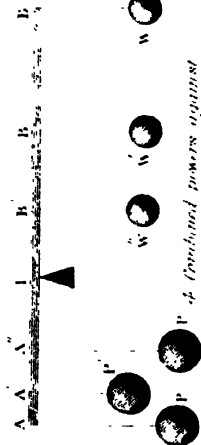
1 First form of Lever



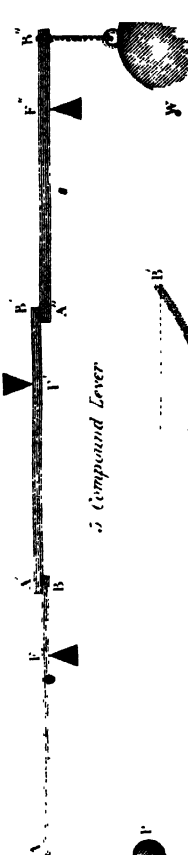
2 Second form of Lever



3 Third form of Lever



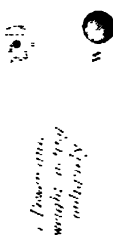
4 Powers and weights applied against balanced weights



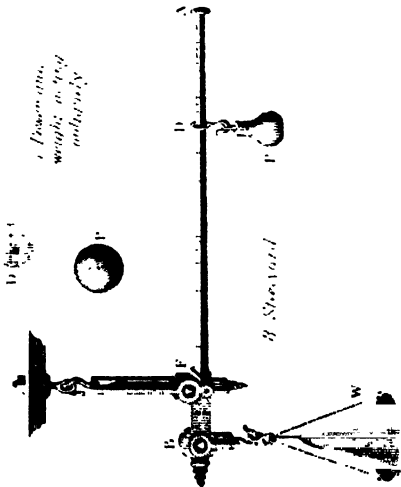
5 Compound Lever



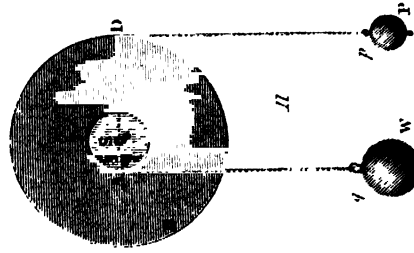
6 Bent Lever



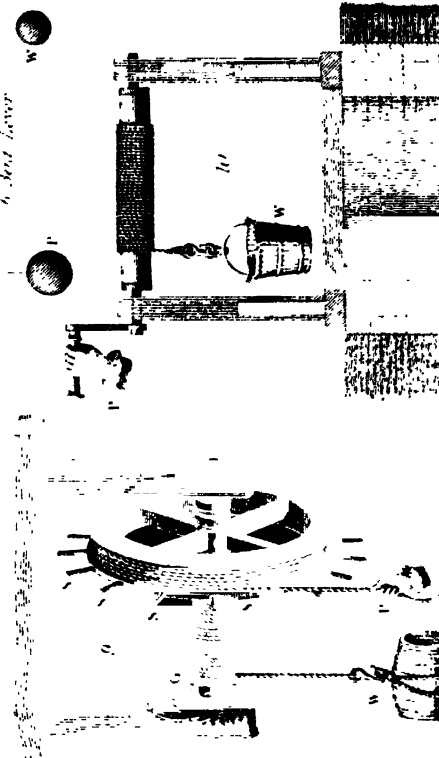
8 Powers and weights applied against balanced weights



9 Steady



10



11 Wheel and Axle



1. *Parmelia stellaris.*



2. *Graphis dendroica*



3. *Collema palmatum*



4. *Arthonia tumidula*



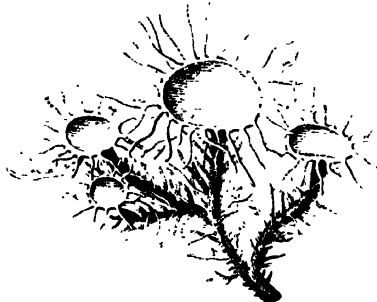
5. *Tetraera ussuriica*
Heckard Moss



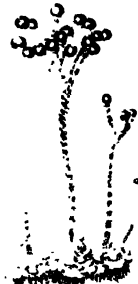
6. *Caloclema sphaerophorum*



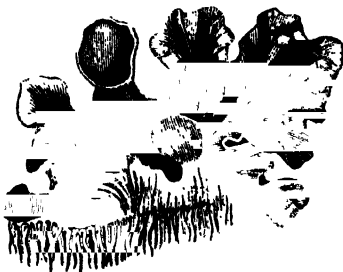
7. *Cnecogone rimpferrina*
(Bear Deer Moss)



8. *Usnea florida*



9. *Cnecogone bulbifera*



10. *Peltidea canina*



11. *Sphaerophora coralliformis*



12. *Ricciaelia globulifera.*



13. *Solorina saccata*.



16. *Roccella tinctoria*
(Orchil).



14. *Sticta pulmonaria*.



15. *Lecidea geographicus*.



19. *Usnea barbata*.



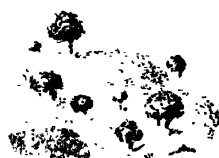
17. *Lecanora canescens*.



18. *Lecanora candelaria*.



22. *Ramalina fastigiata*.



20. *Aeonopsis rosea*.



21. *Gyrophora arctica*.
(Tripe de Roche).



23. *Lecanora tartarea*.
(Cudbear).



24. *Pertusaria anarta*.

L I G H T .

PLATE 1.

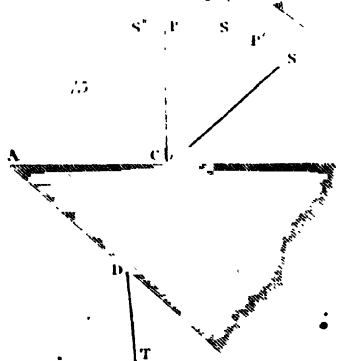
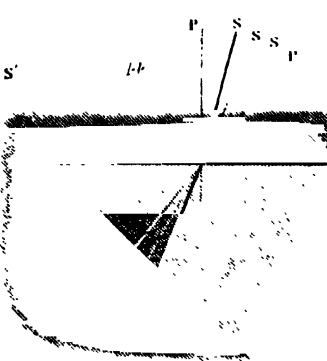
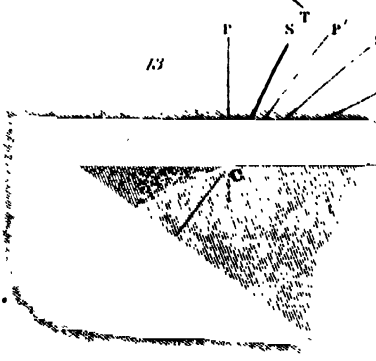
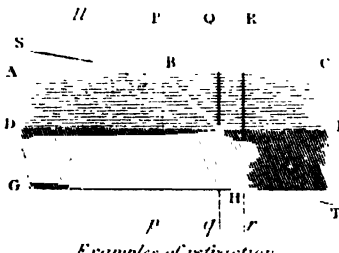
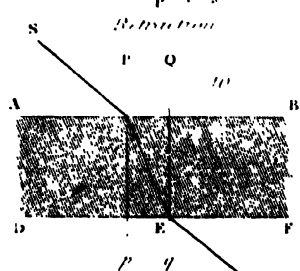
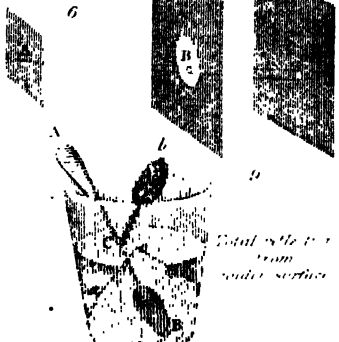
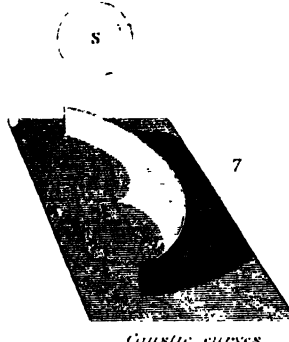
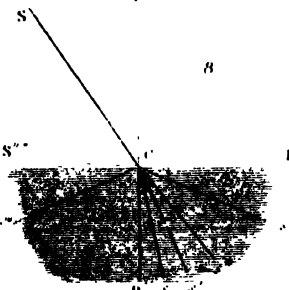
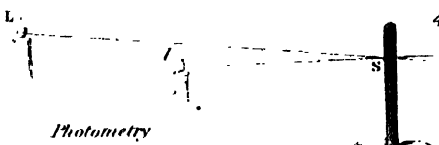
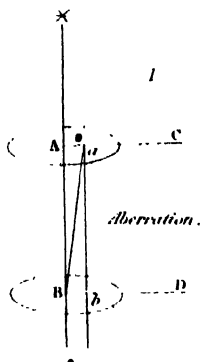
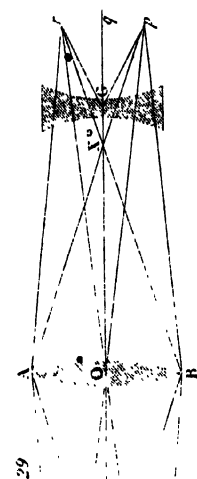
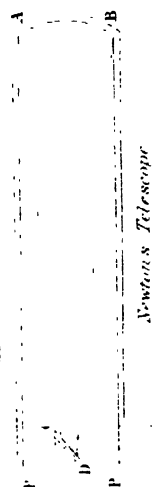


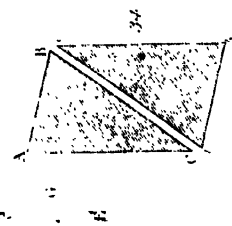
Fig. 1. Fig. 2. Fig. 3. Fig. 4. Fig. 5.



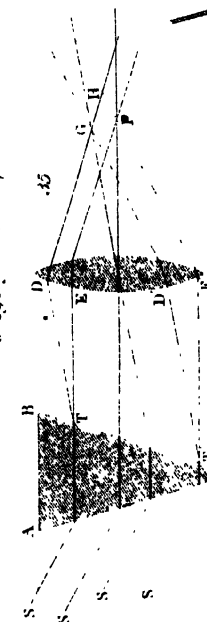
Galilei's Telescope



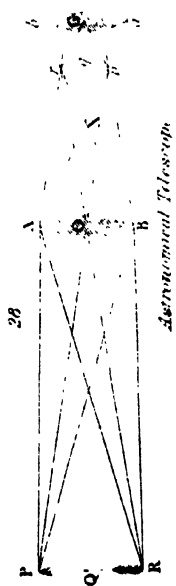
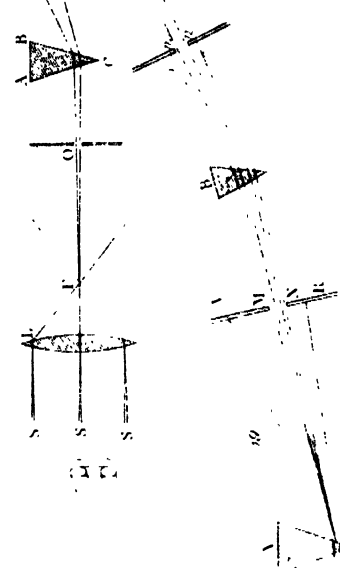
Newton's Telescope



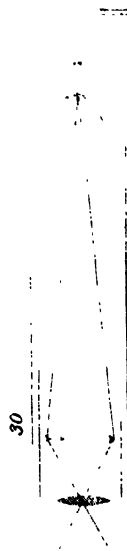
Gregory's Telescope



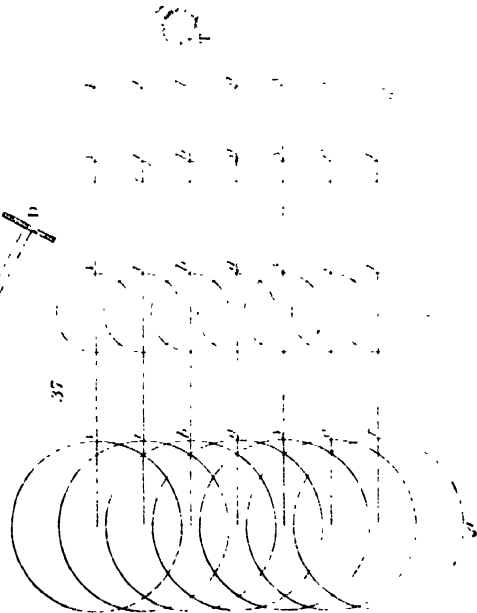
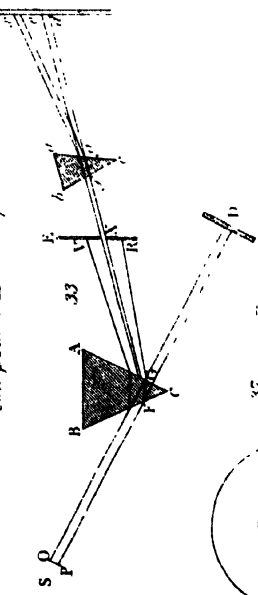
38



Astronomical Telescope



Compound Microscope



L I G H T

• (SPECTRA OF THE SUN, STARS, NEBULAE AND GASES)

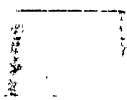
PLATE 4

A B C D E F G H



40

Diffraction Spectrum



41

Continuous Spectrum

a B C D E b F G H J



42

The Sun



43

Aldebaran



44

A. Orionis



45

Absorption Spectrum



46

Sodium



47

Hydrogen



48

Oxygen



49

Nebula 37 H. IV

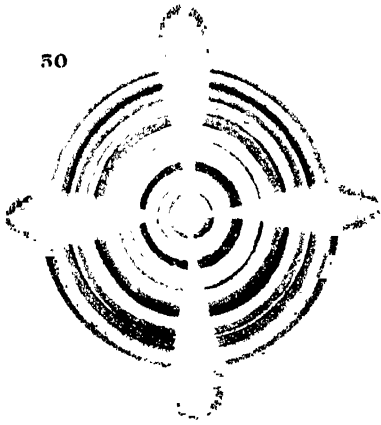


L I G H T .

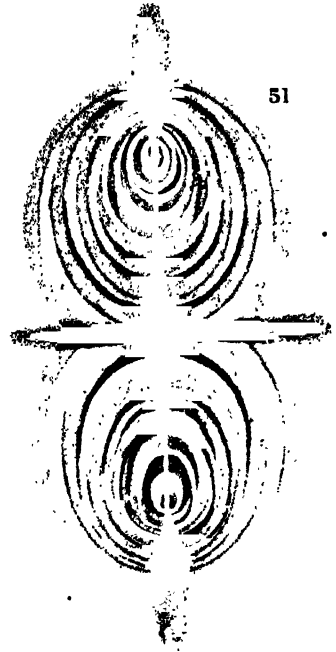
PLATE 5

(COLOURED RINGS PRODUCED BY POLARIZED LIGHT)

50



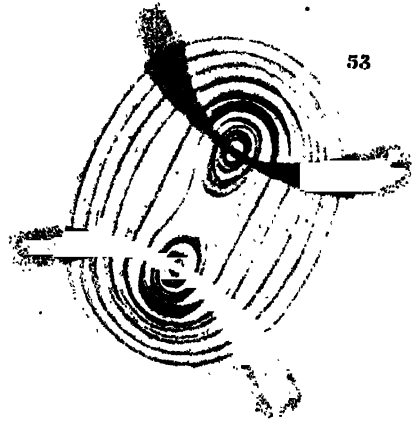
51



52



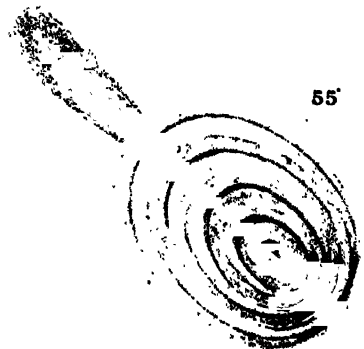
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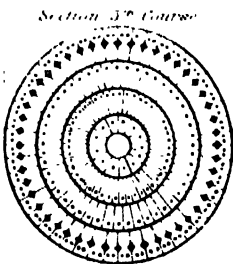
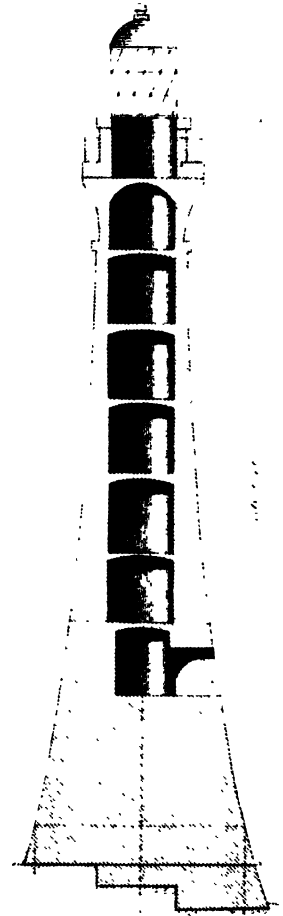
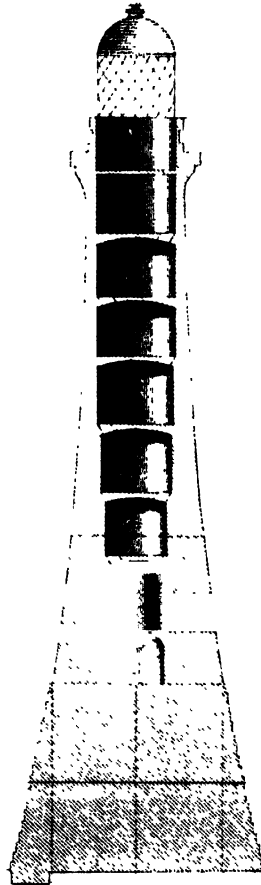
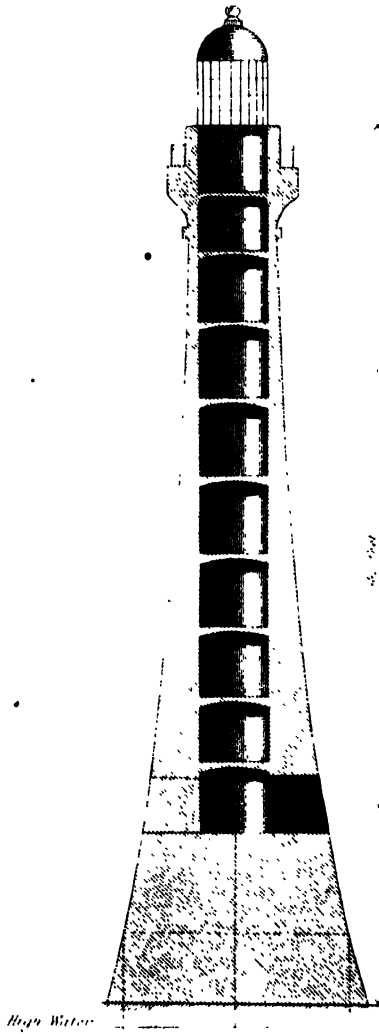


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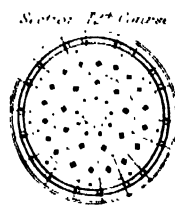


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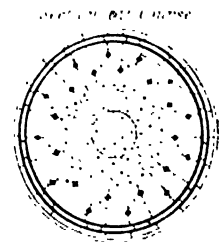




Skerryvore 1838

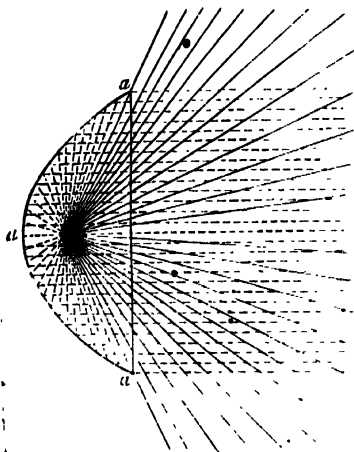


Wolf Rock 1862

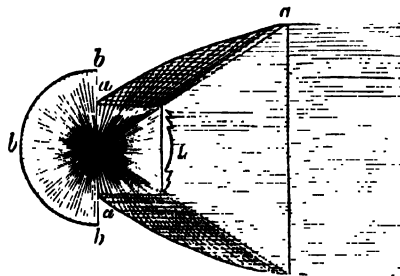


Clacka Voe 1869

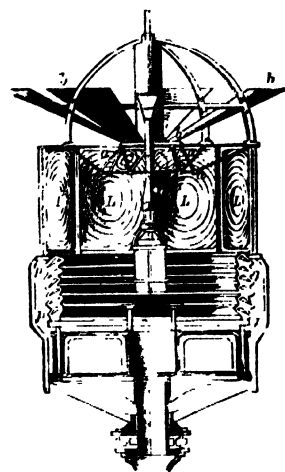
LIGHTHOUSE.



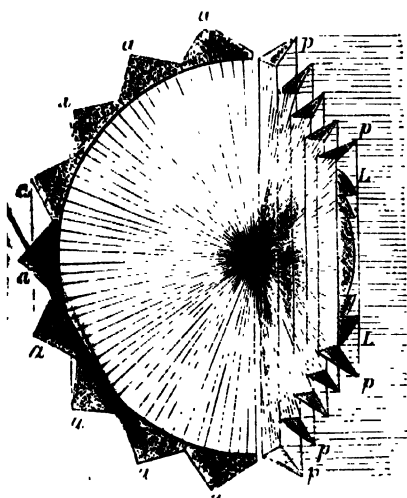
1. Section of Facet Reflector.



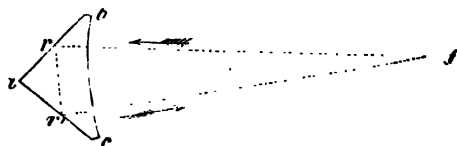
2. Section of Holophotal Reflector.



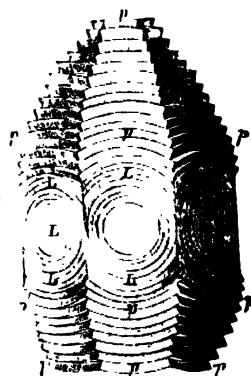
5. Fresnel's Revolving Apparatus.



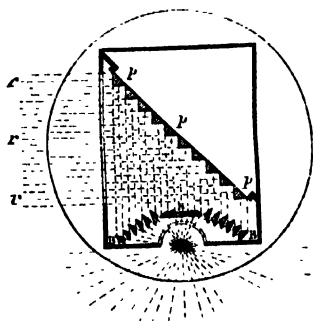
3. Section of Dioptric Holophote.



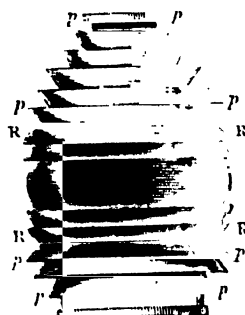
4. Section of Prism, with Ray



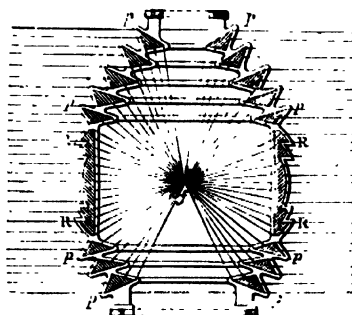
6. Stevenson's Revolving Apparatus.



7. Apparent Light.



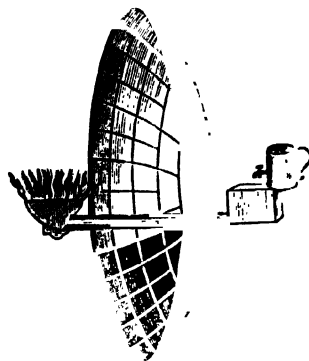
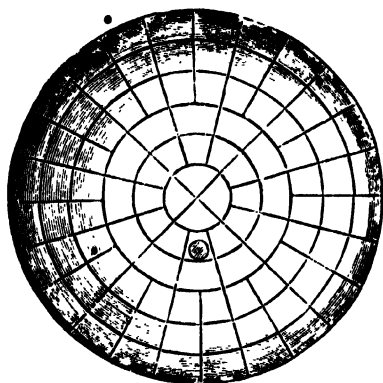
Elevation.



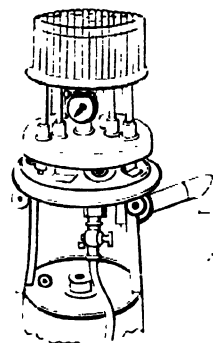
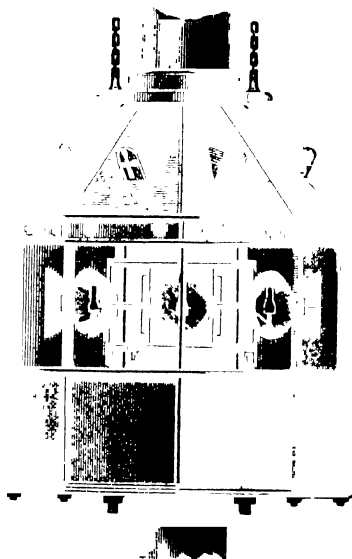
Section.

8, 9. Fresnel's "Bee-hive" Apparatus.

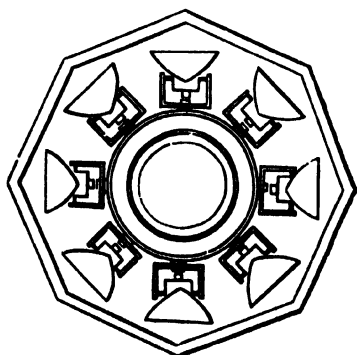
LIGHTHOUSE.



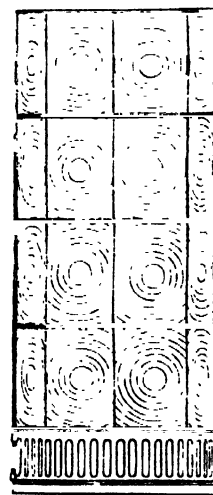
1, 2. Parabolic Reflectors used in the Liverpool Lighthouse, &c.



5. Mr. Wigham's 103-Jet Burner

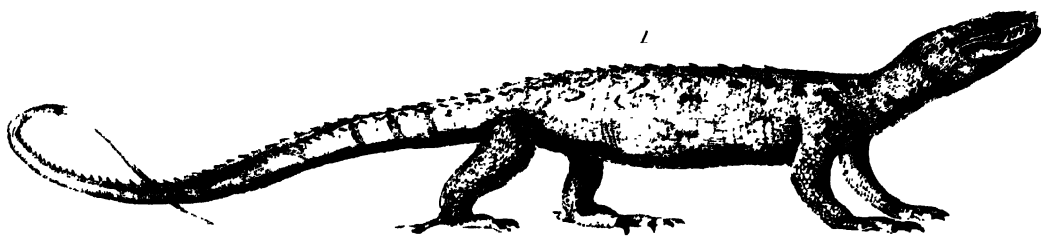


3, 4. Form of Lantern used in Lightship.



6. Arrangement of Burners designed by Mr. Wigham for his Quadriform Burner.

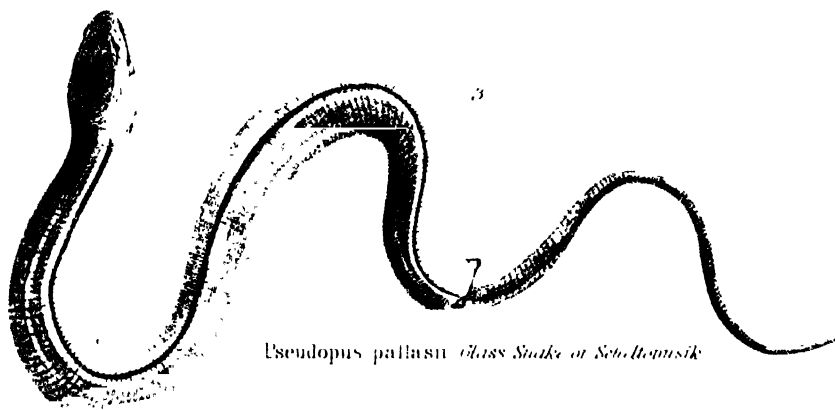
■



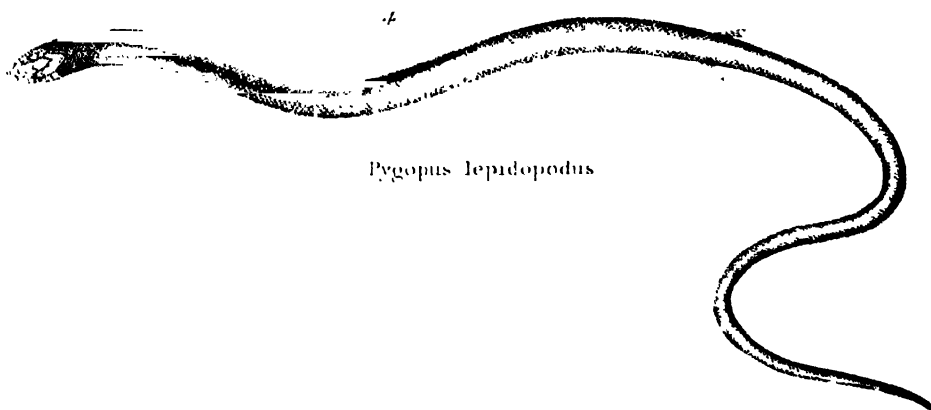
Monitor niloticus *Monitor*



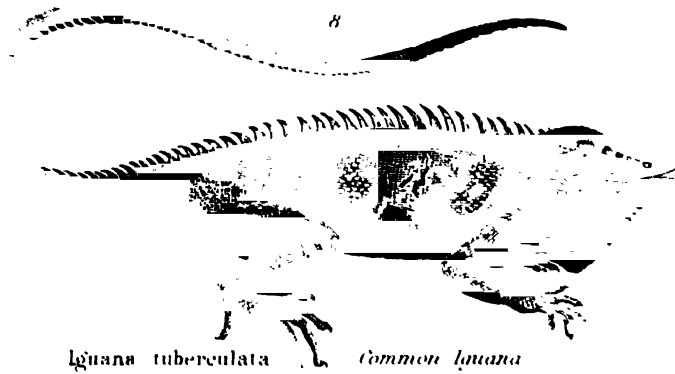
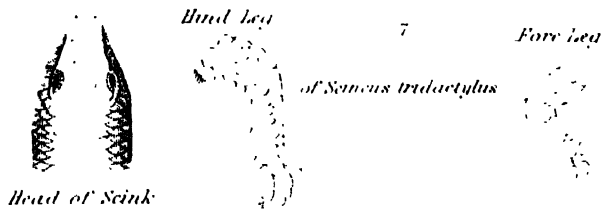
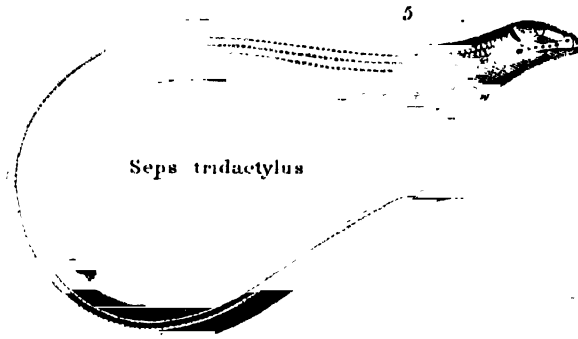
Lacerta ocellata *Great lizard*



Pseudopus pallasii *Glass Snake or Noddy-snake*



Pygopus lepidopodus

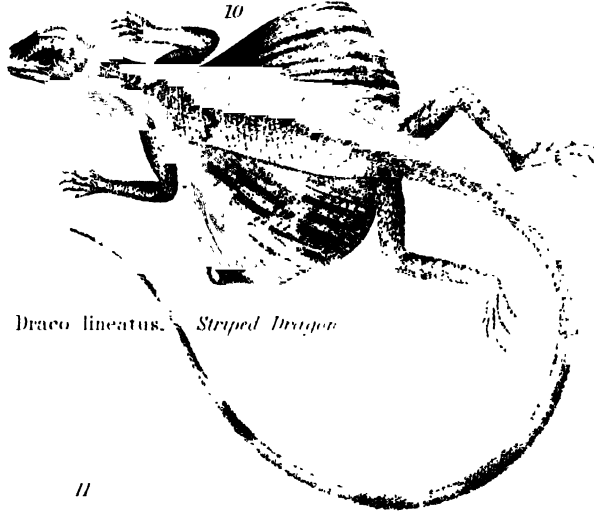


9



Agama aculeata. Spined Agama

10



Draco lineatus. Striped Dragon

11



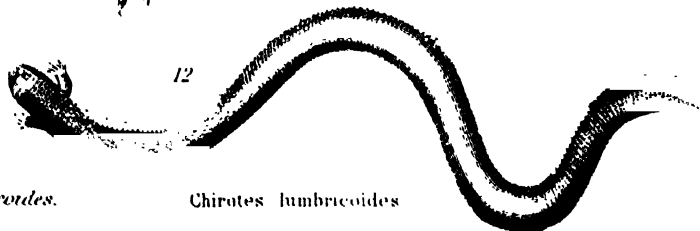
Stelio cordylus. Common Stethor

13



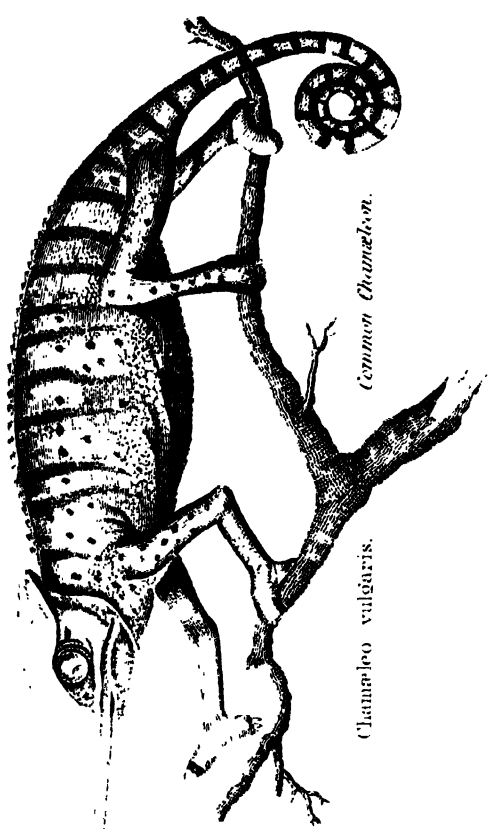
Head of Chirotes lumbricoides.

12



Chirotes lumbricoides

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100



Common Chameleon.

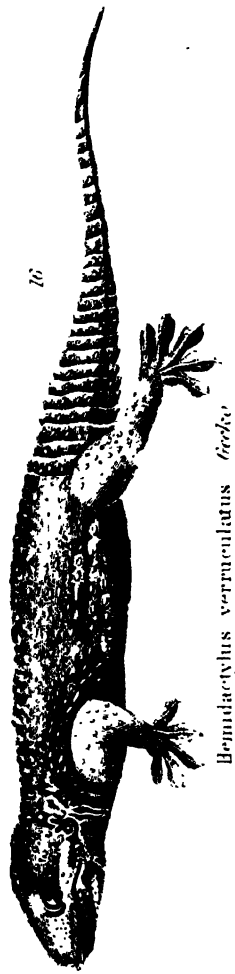
Chamaeleo vulgaris.

15



Anolis alba White Anolis.

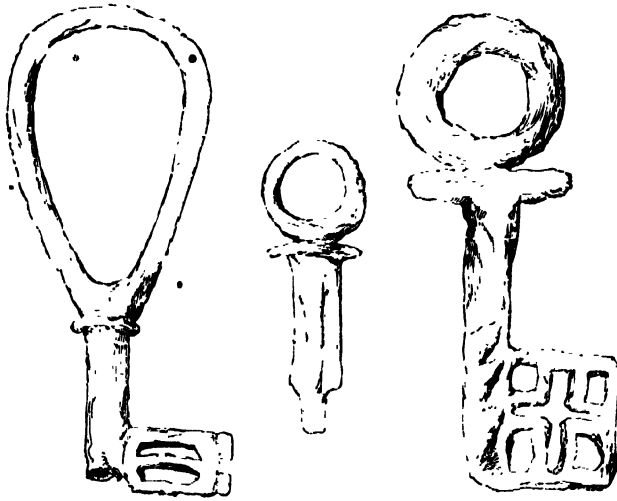
14



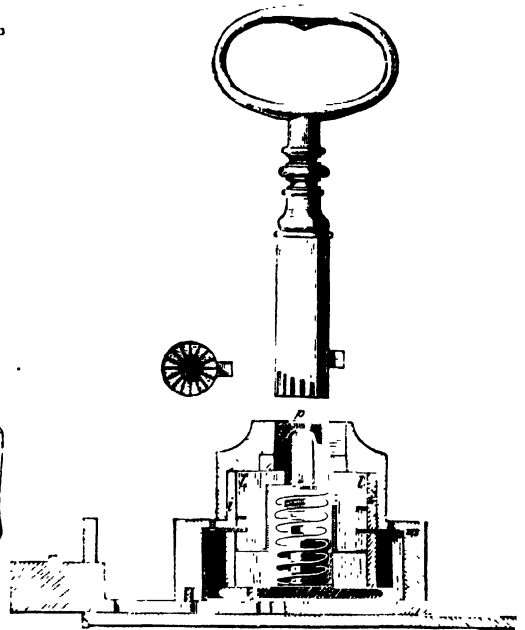
Hemidactylus verruculatus Gecko.

16

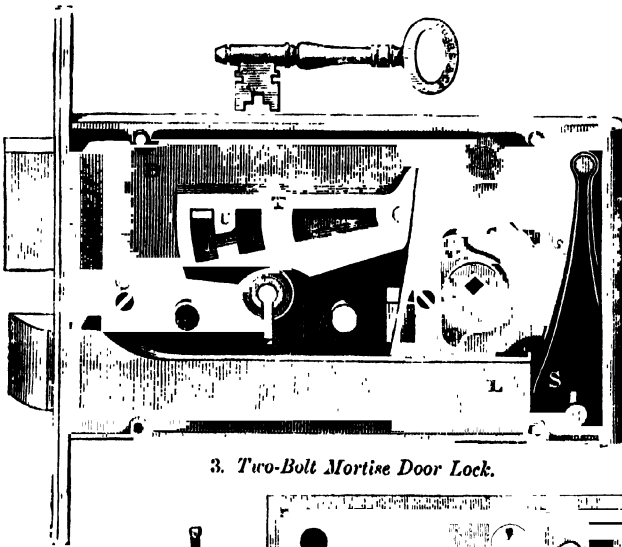
LOCK.



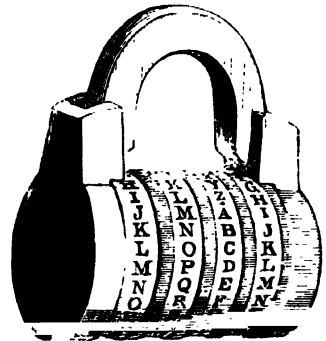
1. Specimens of Keys in the British Museum from Pompeii and Herculaneum.



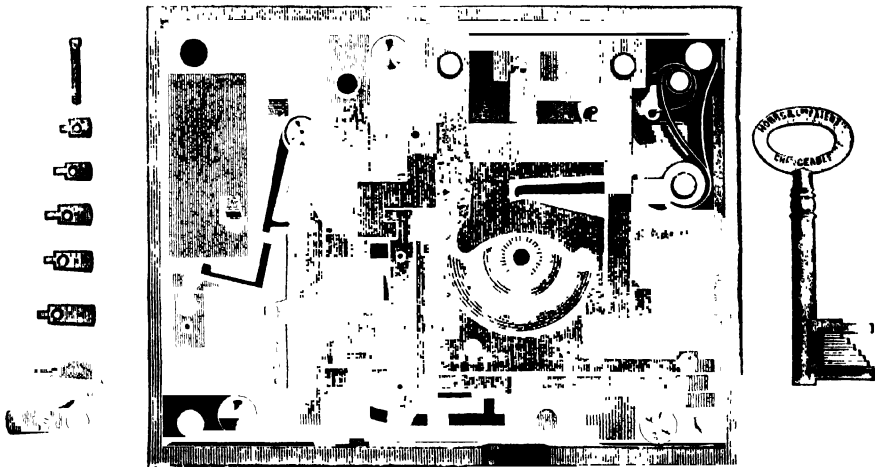
2. Section of Bramah Lock, with its Key.



3. Two-Bolt Mortise Door Lock.



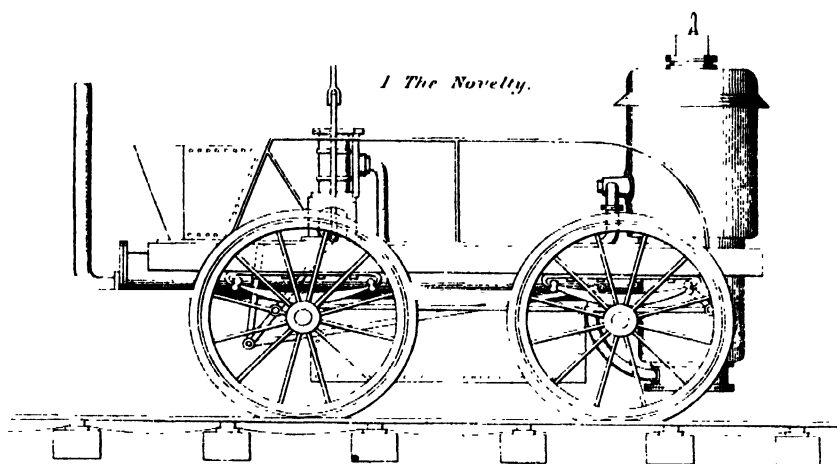
5. Puzzle or Letter Lock.



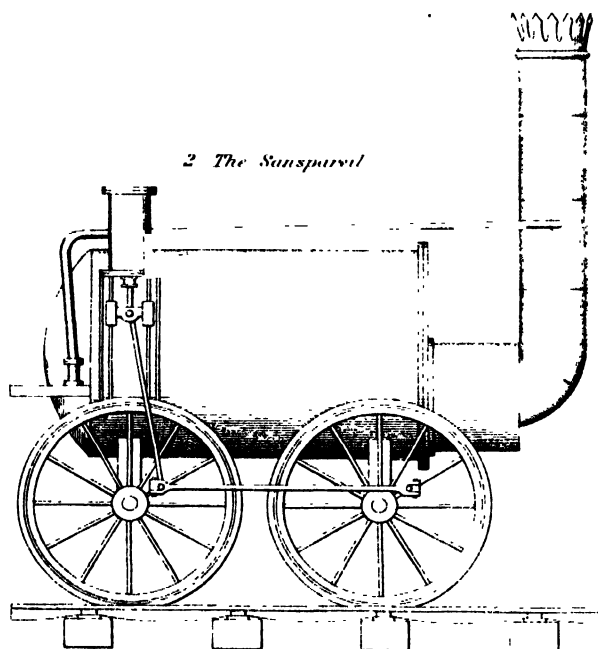
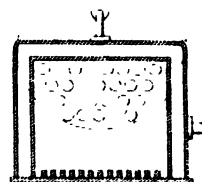
4. Hobbs & Co.'s Patent Changeable Bank Lock.

LOCOMOTIVE.

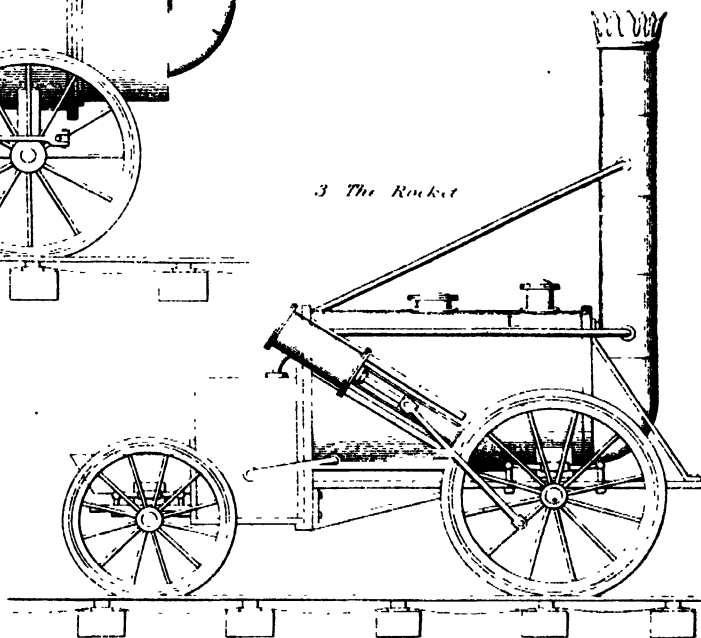
PLATE I.

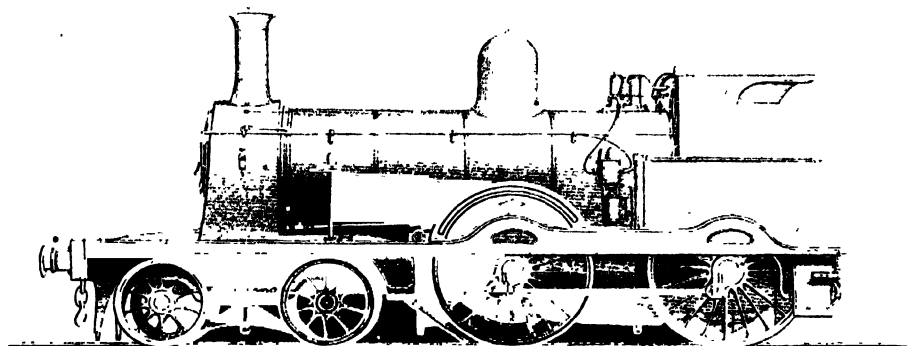


4 Section of boiler and firebox

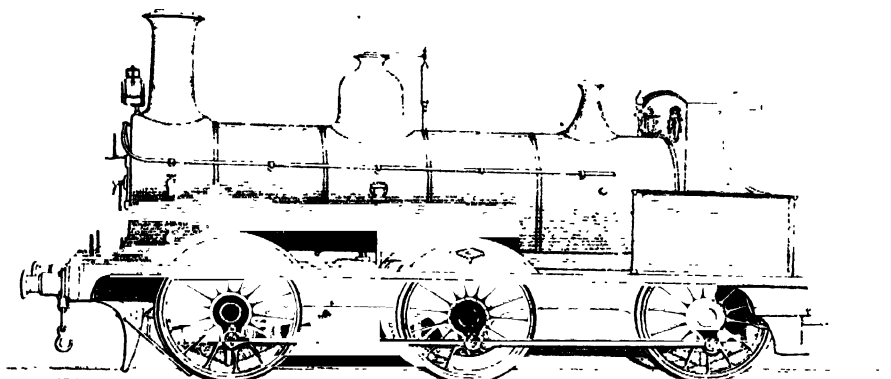


3 The Rocket

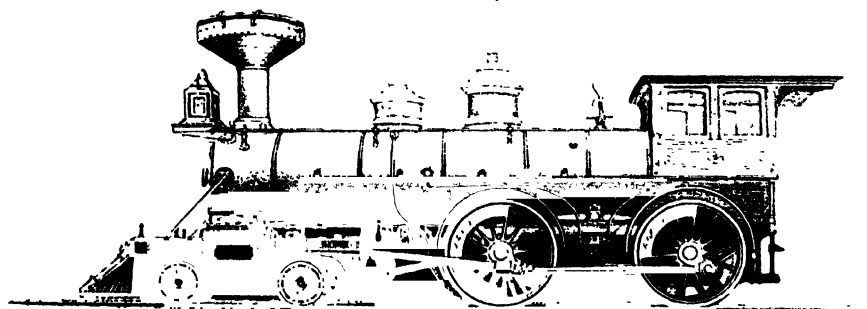




5. Modern Express Bogie Locomotive.



6. Modern Goods Locomotive.

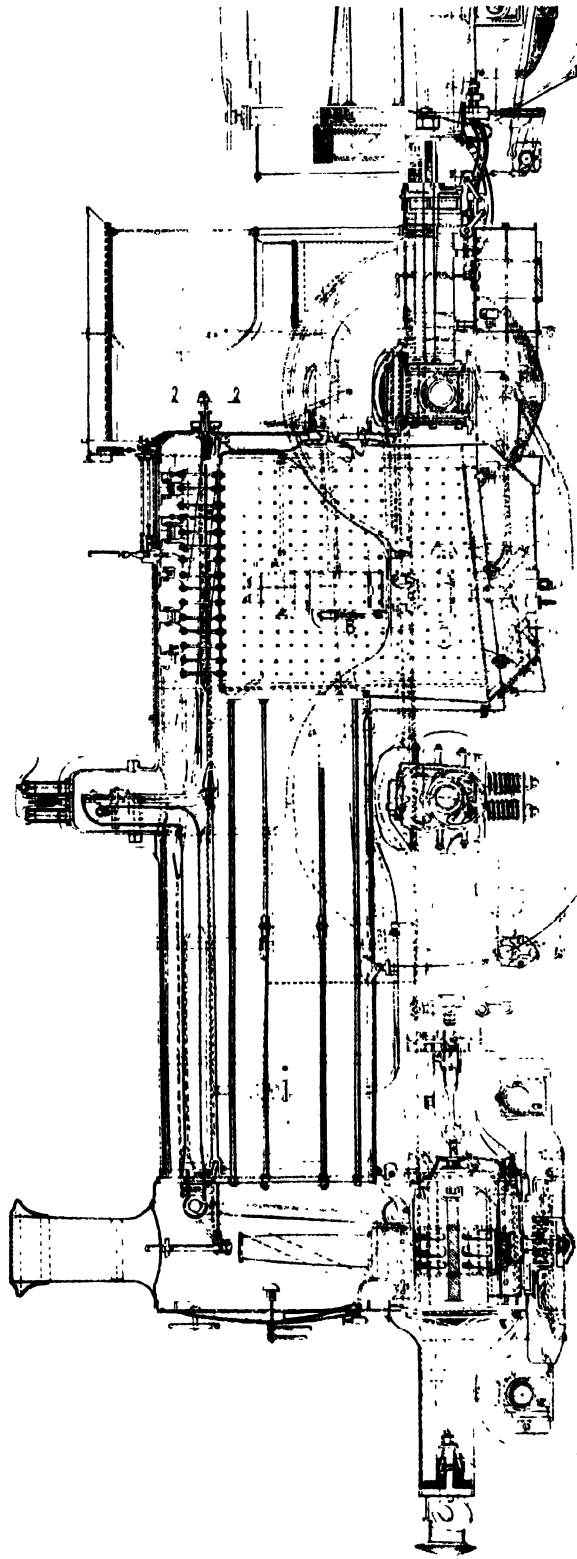


7. American Express Locomotive.

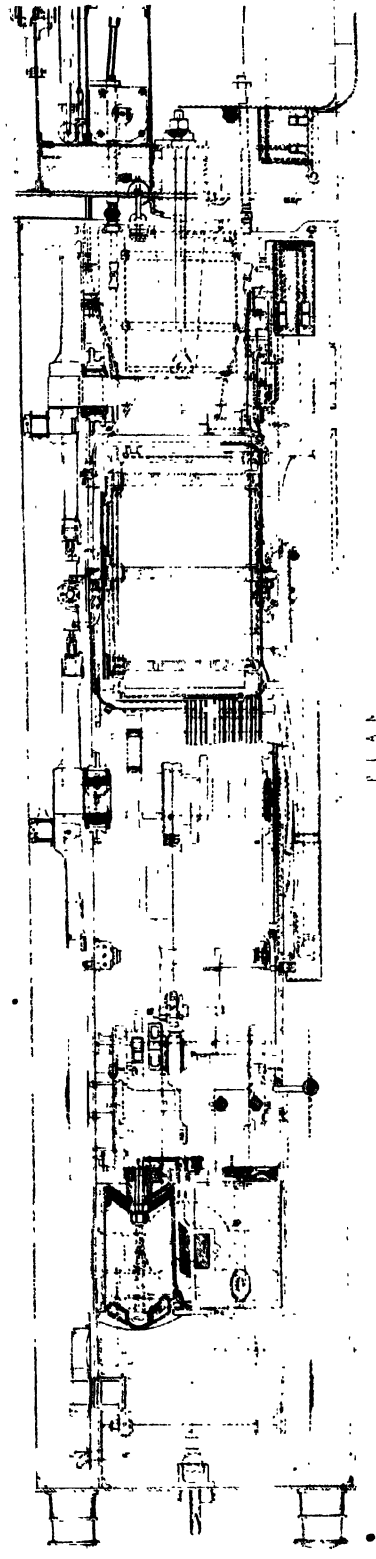
L O C O M O T I V E .

PLATE 3.

(ROGIE PASSENGER ENGINE BY MESSRS NEILSON & CO GLASGOW)



SECTIONAL ELEVATION

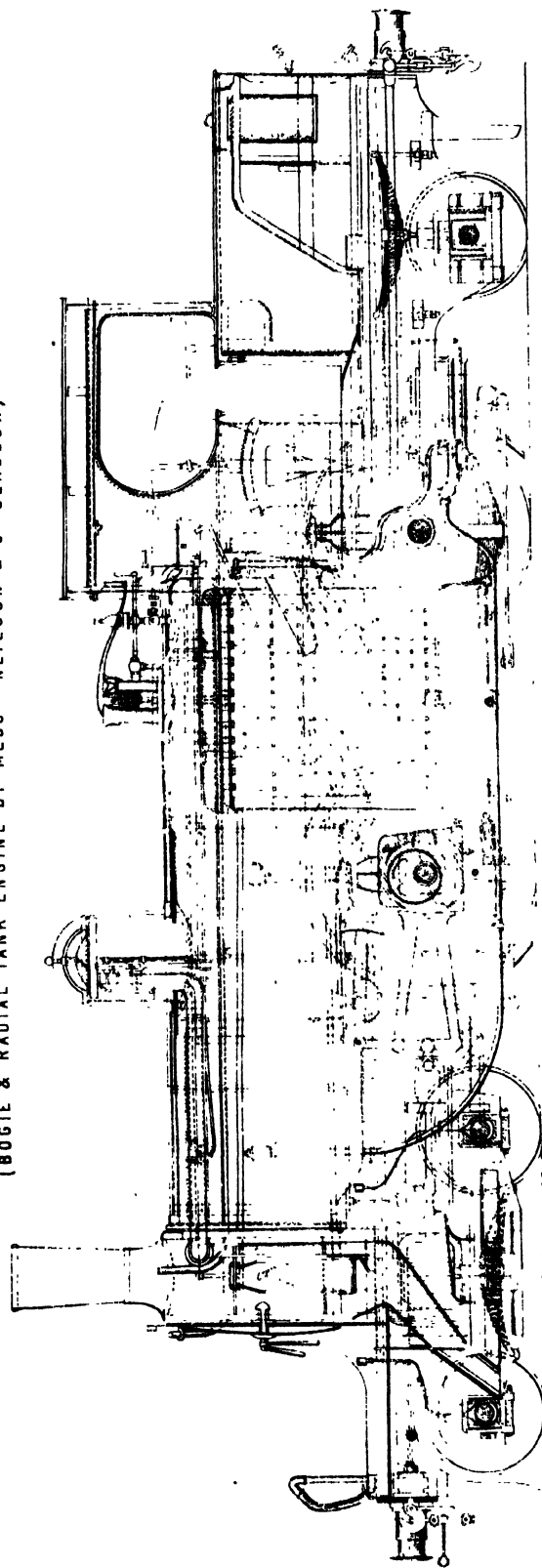


PLAN

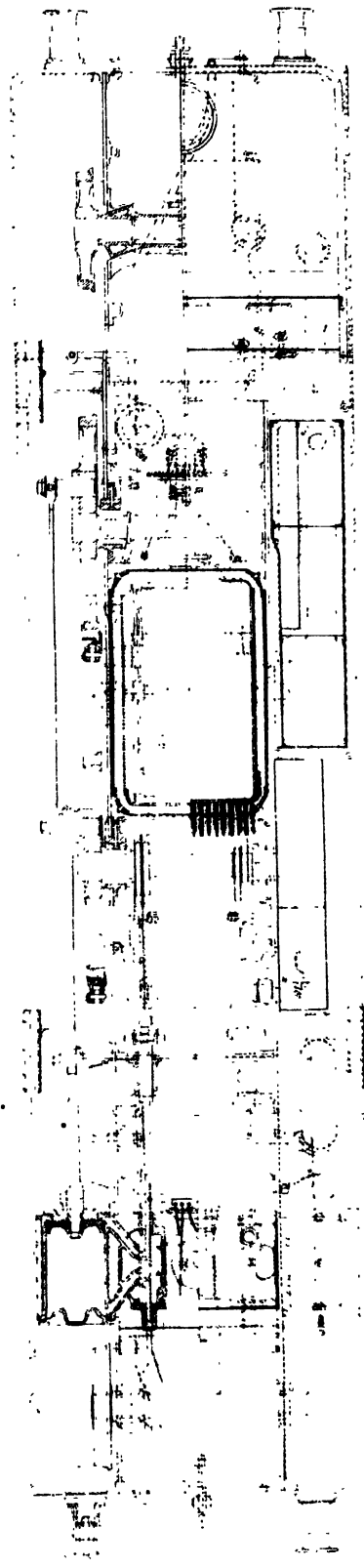
LCCMOTIVE.

(BOGIE & RADIAL TANK ENGINE BY MESSRS NEILSON & CO GLASGOW)

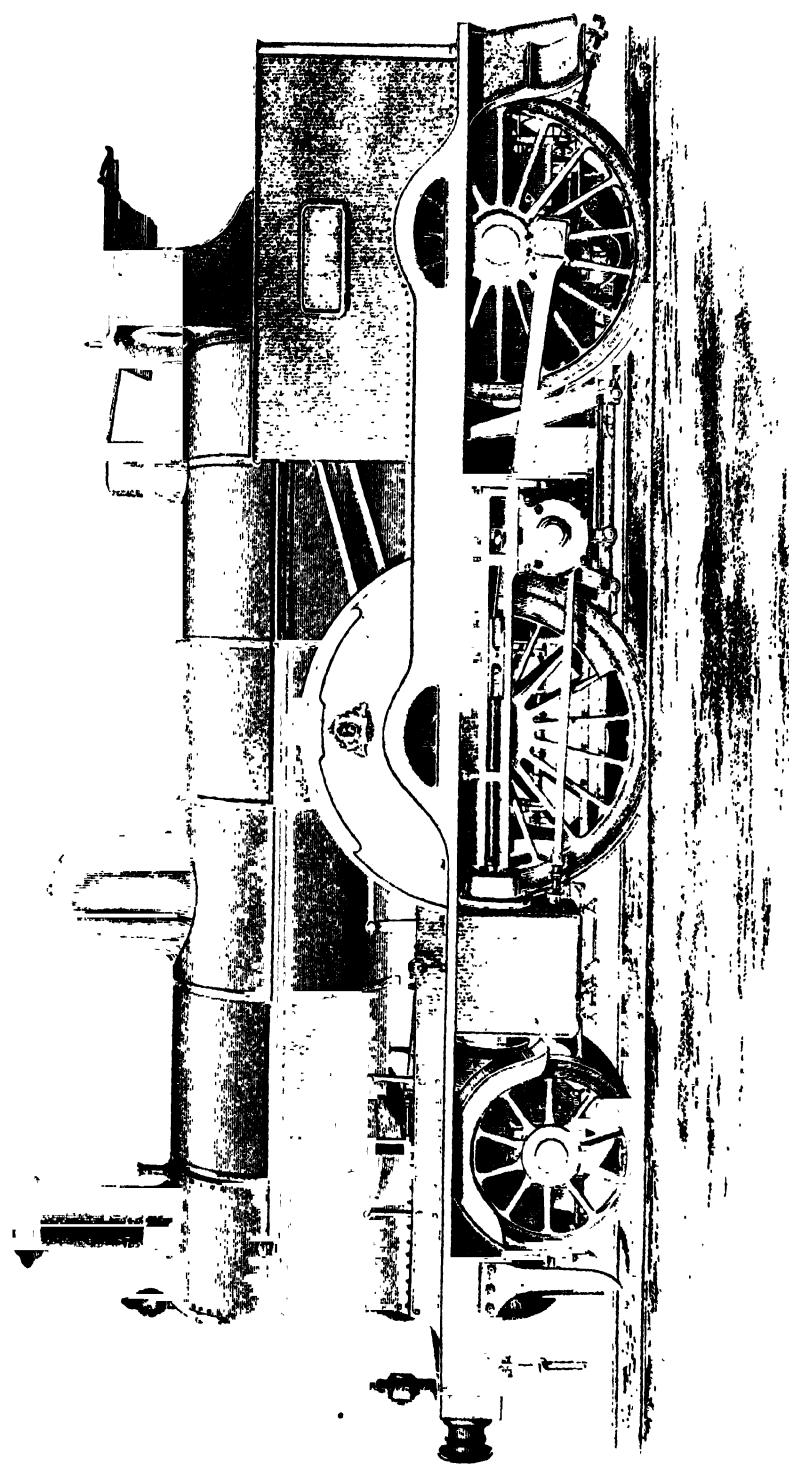
PLATE 4



LONGITUDINAL SECTION

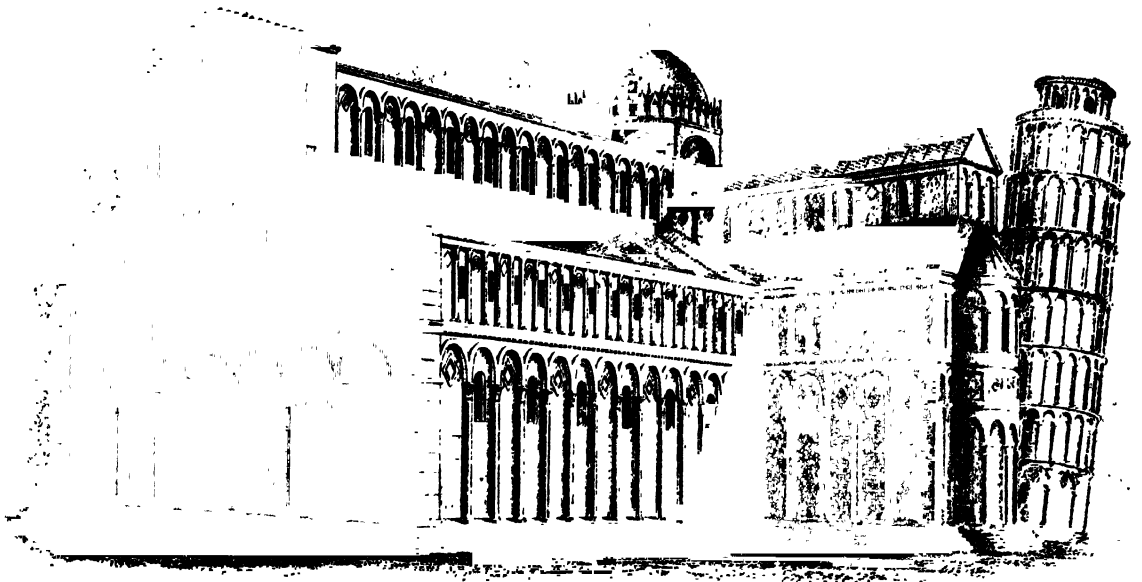


PLAN

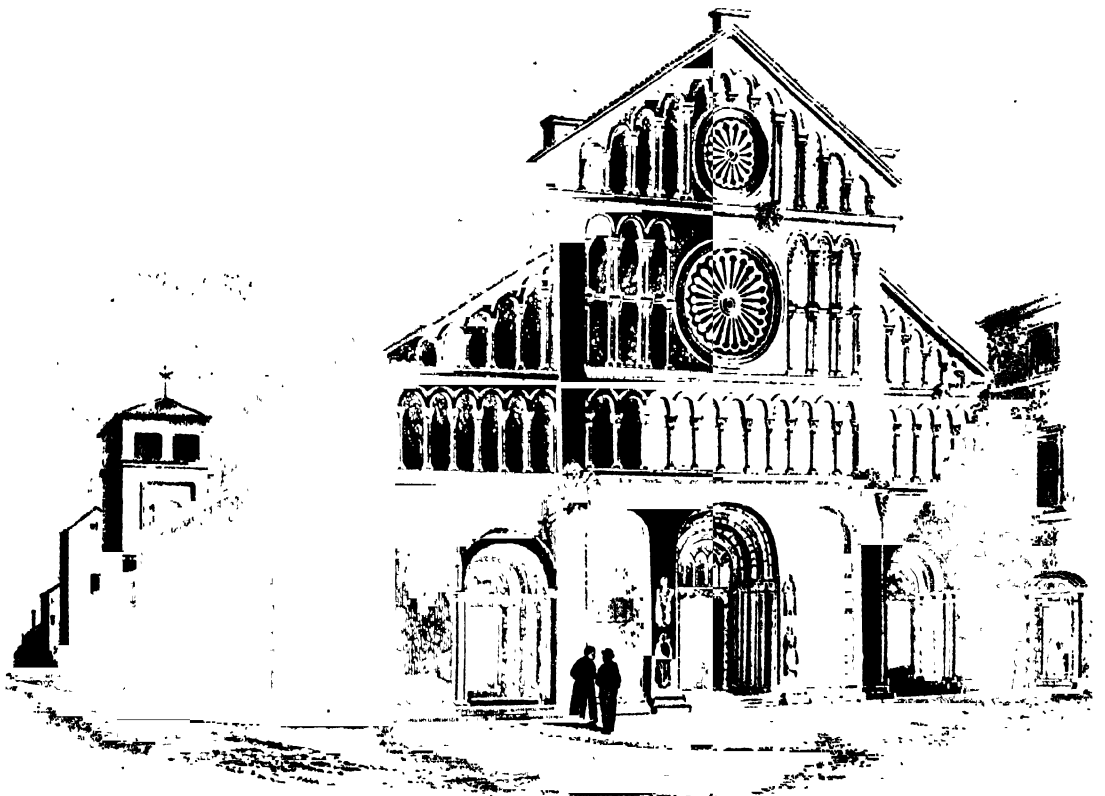


THE GREAT EASTERN RAILWAY
CLASS 4-4-0 LOCOMOTIVE

LOMBARDIC ARCHITECTURE



Cathedral and Campanile



Cathedral at Zara in Dalmatia

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VOL. VIII.

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LEAF,	" I.-III.
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LEMUROIDEA,	I.
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NATIONAL ENCYCLOPÆDIA:

A DICTIONARY OF

UNIVERSAL KNOWLEDGE.

IRELAND FORGERIES.

IRELAND FORGERIES (of Shakspeare). These were due to a clever youth of eighteen, who, aided by his father, amused himself harmlessly with imaginations of what sort of evidence might some day turn up about Shakspeare. Unhappily these were afterwards given to the world as genuine. The father, Samuel Ireland, had been a miscellaneous artistic writer ("Picturesque Tour through Holland," "Views on the Upper Avon," &c.); the boy, William Henry Ireland, was born in London in 1777. The forgeries began in 1795 with a receipt, a mortgage deed, and a Protestant Confession of Faith by the poet himself. Ireland had his forgeries printed on old paper; but he was wise enough to know the danger of detection through the *water-mark*. He therefore rejected all the paper bearing a mark. Subsequently he picked up in conversation the knowledge that a jug was a common Elizabethan water-mark. He then selected such leaves of old paper with this water-mark as he could find, and mixed them with his blank leaves sparingly. The lad was no hand at Elizabethan spelling, as this extract will show from the conclusion of the Confession:—"O cheryshe use like the sweete Chickenne thate under the covert offe herre Spreadynge Wings Receyves herre lyttle Broode, ande hoverynge over themme, keepes themme harmlesse and in safetye." But people were only too ready to be gulled. A book of jests was "discovered," nay, precious love-letters to Anne Hathaway, theatrical memoranda, a new version of "King Lear," with numerous alterations. One of them is worth quoting. Kent says:—

"I have a journey, sir, shortly to go;
My master calls and I must not say no."

Young Ireland in his confessions says this seemed to him too jingling and unmeaning for the occasion. He substituted a long passage beginning—

"Thanks, sir! but I go to that unknown land
That chains each pilgrim fast within its soil;
By living men most shunned, most dreaded," &c.

It is almost incredible that men should have been deluded by such stuff. The crowning triumph of Ireland was the production of "Vortigern and Rowena," an entire new play, and its actual performance as Shakspeare's at Drury Lane by Kemble! The controversy had hitherto been upon water-marks, colour of ink, spelling, allusions, &c. No one had stayed to listen to the lines. But the public, at last called into court, was not to be deluded, and at the line spoken by Kemble—

"And when this solemn mockery is o'er"—

a burst of catcalls drowned the rest of the play.

Ireland confessed his literary sins. He had not the excuse of genius, such as Chatterton's, to palliate his offence. He died in 1835.

VOL. VIII.

IRENE.

IRENÆ'US, ST., Bishop of Lyons, one of the most illustrious of the ante-Nicene theologians, is said to have been born in the neighbourhood of Smyrna in Asia Minor between the years 120 and 140 A.D. He was a disciple of Polycarp, and afterwards became a presbyter of Pothinus, bishop of Lyons, who suffered martyrdom in the persecution of Marcus Aurelius in 177. The following year Irenæus was called upon to succeed him, and he sustained the office until 202, when, according to Gregory of Tours, he suffered martyrdom in the persecution under Septimius Severus. His ministry in Gaul was attended with great success; the city of Lyons became almost wholly Christian, and numerous missions were sent out for the conversion of the surrounding pagans.

Irenæus, however, is chiefly remembered on account of his labours as a theologian, his active opposition to the Gnostics, and his interference on behalf of peace and unity in the controversy between the Eastern and Western churches as to the time and manner of celebrating the Easter festival. Only one of his works has come down to us in a complete form, a treatise in five books, "Against Heresies," which has been preserved in a somewhat barbarous Latin translation. It contains a description of the tenets of the various Gnostic and Ebionite sects of that period, and an exposition of what Irenæus regarded as the true principles of Christianity. The work is of very great value for the picture it gives of the moral and theological position of the church at that period. He was also the author of several other works, but of these only fragments which have been preserved as quotations remain. The best editions of the "Adversus Hæreses," which was first printed by Erasmus in 1526, are those of the Benedictine Massuet (Paris, 1710) and of Adolph Stieren (1849-53). The whole of the writings of Irenæus have been translated into English and published in Clarke's "Ante-Nicene Library."

IRENE (or more accurately *Eiréné*), Empress "of Rome," as the Byzantine Empire still loved to call itself, was of a good Athenian family, but in reduced circumstances before her beauty and her many accomplishments won the esteem of the Emperor Copronymus (Kopronomos), who chose her at about the age of nineteen as the bride for his son Leo, afterwards Leo IV. The marriage took place under circumstances of great pomp, A.D. 769. Irene made a good wife, and gained not only the love of the emperor but of the whole people; consequently when at Leo's death in 780 she was found to be named regent for the youthful Constantine VI. every one received the news with satisfaction, and the empress began her regency with good wishes from every side. Her administration was most able and intelligent. Among other things she restored images to the churches as objects of adoration, thus

annulling the action of many past Byzantine emperors, and for this a grateful priesthood likened her and her son to a second St. Helena and Constantine the Great. Indeed, Irene actually is sainted in the Greek calendar at this day. She caused a council to be called at Nice (Nikaia in Bithynia) in 787, to formally denounce iconoclasm. She even held her own to a certain extent against the victorious Charles the Great (Karl), king of the Franks, in Italy. But the servile adulation of a Greek court corrupted young Constantine. He saw his mother's ability and appreciated her success, but as he grew up it galled him to be in leading strings, and he set himself at the head of a conspiracy. Irene easily defeated it, but at the cost of the affection of her son. Matters went worse, until Irene determined (and was fully justified for the welfare of the state in her deed) to effect a *coup d'état*. She required an oath of fidelity to herself to be sworn by all the principal men of the empire. But they pronounced for the lawful emperor, and Constantine was proclaimed. His first act was to banish the great empress. Irene submitted, and that so entirely that Constantine, no longer angry when he had his will, allowed her to return to court. Meanwhile his vices, his incapacity, and above all his divorce and remarriage (a heinous offence in Eastern eyes), had shown the people at last what a grievous change for the worse they had made in their ruler. A great conspiracy grew up. Irene consented to place herself at its head, and the path of treachery once entered, nothing seemed to stay her. The plot was revealed, Constantine fled in terror; he was captured, brought to the palace in Constantinople, and with the consent of his inhuman mother was rendered incapable of empire by the loss of his sight. Even that act was performed with such terrible gushes that his life was despaired of (792). He survived, however, and was kept a close prisoner many years.

Irene soon had a new enemy to face. Peace returned to the East, and the former good government; but in the west anarchy and bloodshed prevailed, and Charles the Great, now bent upon Italian conquests and the foundation of a great Frank Empire, took advantage of the fact of Irene being the first female sovereign, to declare himself the successor of Constantine VI., and to be crowned emperor at Rome (800). He did not invade the dominions of Irene, in fact the Holy Roman Empire of the West went on for many centuries together with the Roman Empire of the East, that is, the Byzantine Empire. All the same the subjects of the empress were touched in the miserable pride of titles, which is so curious a feature in the Byzantine Empire; and this, and perhaps also some lingering elements of the party of Constantine, soon set plots afoot against Irene. The grand treasurer, Niképhoros, conducted one of these plots to success, 802; Irene was deposed, and he became emperor. As when her son had banished her, so now when exiled to Lesbos, she submitted with dignity. She even sought to arrange her fall in an interview, which showed her great self-command and nobility of spirit; but Niképhoros was base enough to insult her by the gift of her life alone. She supported herself for a year by the labours of her distaff, and the dignity with which she accepted her hard lot covered her with praise. The early and the late career of Irene commands our entire respect and admiration, but the horrible crime which stains it in the midst destroys the whole lesson of her life. It seems impossible that she really did know of, or consent to, the mutilation of her son; but we have to take the faulty and perverse historians of this period as we find them, and the fact is stated as above. Irene died in Lesbos, 803.

IRENE, one of the asteroids, was discovered by Hind in 1851.

IRETON, HENRY, a great general of the parliamentary army in the Civil War, was born of a good Notting-

hamshire family in 1610, and entered Trinity College, Oxford, in 1626, proceeding to the Middle Temple to read law. Upon the final outbreak of the Civil War he joined the parliamentary army as a trooper in Essex's Life Guards, and quickly rose to be commissary-general under Fairfax, distinguishing himself at Naseby, June, 1645, and being mentioned as leading an important movement in the siege of Bristol by Cromwell in his report to the Speaker of 14th September, 1645. The outcome of this connection with Lieutenant-general Cromwell was the marriage of Ireton to Cromwell's daughter, Bridget, at Lady Whorwood's house in Holton, 15th June, 1646, by Dell, Fairfax's chaplain, in the presence of the rector of the parish, as stands in the old register there to this day. Thus did they commemorate what was fondly hoped to be the end of the Civil War and the signing of the treaty of peace. The king had fled to the Scots; Princes Rupert and Maurice and hundreds of Royalists left the kingdom (or went to the northern parts of it); and the Parliament recruited its wasted ranks with 230 new members. Ireton was among these as member for Appleby. He was often with the king at Hampton Court in the negotiations with the army in 1647, and indeed upon him, as the skilled political draughtsman among the military party, the great weight rested at this crisis. Ireton indeed looked to the king as the means of settlement, not to the Parliament; and though, as he bluntly told the king, "there must be some difference between conquerors and conquered," yet he believed that "King Charles could be so managed as to comply with the public good after he could no longer uphold his violent will" (Mrs. Hutchinson's "Memoirs"). The terms Ireton drew up and laid before Charles were wonderfully wise and moderate: freedom of belief and worship to all, even to Catholics, triennial Parliaments, reform of the House of Commons, taxation, law, and commerce regulated upon just bases. Charles only saw a chance of sowing discord between his enemies. Ireton detected his very first moves, and quietly told him, "You have an intention to be the arbitrator between us (the army) and the Parliament, and we mean to be so between the Parliament and your Majesty." Cromwell adopted Ireton's policy heartily, but the Parliament was as obstinate as the king; the truth was that neither wished to give way. In the end Cromwell, Ireton, and the army found they had been duped; the king fled to the Isle of Wight, and the last chance of peaceful settlement had gone. The whole army joined in execrations at the perfidy of the king, who was in correspondence, not only with the Parliament, but with London and the provinces, with a view to a fresh rising, and with the Scots for the same purpose. "The king is a man of great parts," said Cromwell in words often quoted, "but so great a dissembler and so false a man that he cannot be trusted." Ireton's faith in Charles was the more terribly broken as he had been relying the more upon it. He refused to have anything more to do with such a man. He was chosen, and served, as one of the judges or "regicides" who tried and condemned the faithless king to death—a grave political mistake, as we should now judge it to be, since it converted a worthless sovereign into a martyr. In August, 1649, Ireton went as third in command (major-general) under Cromwell to Ireland, and became first president of Munster, and then on Cromwell's departure lord deputy, May, 1650. Cromwell had practically done the work of conquest in the few months he had had at his disposal. Ireton and Ludlow completed it. The siege of Limerick, June, 1651, was Ireton's greatest military exploit. The town was not taken till October. A month later, and the lord deputy was carried off by fever. He was buried in Westminster Abbey on 6th February, 1652; and his remains had the honour of being exhumed, gibbeted, and burned at Tyburn by the men of the Restoration.

IRIARTEA is a genus of PALMS, natives of tropical South America. They grow to a considerable height (60 or 80 feet), and throw out roots beginning from the base of the stem upwards. The lower roots and the base of the stem decay as new roots are produced higher up, and frequently it is possible to walk through the roots and stand directly under the tree. The stems are smooth, marked with the circular scars of the fallen leaves, and crowned with a tuft of large pinnate leaves. The spikes of monocious flowers hang from below the leaves, and are inclosed in several spathes. The best known species is *Iriartea exorrhiza*, the *pashiuba* of Brazil. The wood is very hard on the outside, but soft within. It splits easily and straight, so that it is used for making shelves, seats, the floors of canoes, ceilings of houses, &c. The natives also use the hollowed stems as musical instruments. Quantities are exported for walking-sticks and umbrella-handles.

IRIDÆE is an order of plants belonging to the section Epignæ of the MONOCOTYLEDONS. Iris is the typical genus. The plants are herbaceous, with corms or rhizomes; generally equitant leaves, petaloid perianth of six leaves; three stamens situated at the base of the outer row of the perianth, with anthers opening outwards; style dividing into three stigmas, which are often petal-like; ovary three-celled, inferior; seeds with copious albumen. Besides Iris this order includes Crocus, Ixia, Gladiolus, and Tigridia. It is a large order, widely diffused in warm and temperate regions, being especially abundant at the Cape. Saffron is made from the stigmas of two species of Crocus. Orris-root is derived from an Iris. The sap of many species is acrid, purgative, or emetic.

IRIDIUM, a metal found in combination with platinum in the Ural mines of Russia, and also with gold in California. When native platinum is dissolved in nitrohydrochloric acid, the residue consists of an alloy of iridium and osmium, called iridosmine. These metals are converted into chlorides by fusion with chloride of sodium; by boiling with nitric acid osmic acid is evolved, and the iridium is then precipitated by chloride of ammonium; the precipitate on ignition gives metallic iridium. There are other ores of iridium; one, an oxide, contains also rhodium and palladium. It is the most refractory of all metals except osmium and ruthenium, and is not fusible in the ordinary oxyhydrogen blowpipe. It is, however, completely fused in Deville's lime furnace with oxyhydrogen blast. It is a white metal resembling steel, but rather brittle. The specific gravity is 21.15; the atomic weight is 99; the symbol Ir. It is insoluble in all acids. It is much used as an alloy with platinum for making platinum vessels for use in the laboratory and in some chemical manufactures, especially for the distillation of oil of vitriol. The alloy is less easily attacked by acids than pure platinum. It is also much harder, more ductile, and very malleable. It forms alloys also with most of the ordinary metals. It is a good deal used in tipping gold pens and hypodermic needles, and in many small instruments used by surveyors and engineers the working parts of which are subject to much wear. There are four oxides—protoxide or hypoiridious oxide (Ir_2O), sesquioxide or irridious oxide (Ir_2O_3), the dioxide or iridic oxide (Ir_2O_2), and the trioxide or periridic oxide (Ir_2O_4). There are three chlorides, three iodides, and four sulphides, but none of these compounds are of any importance. Iridium is distinguished from all metals, except ruthenium and rhodium, by its insolubility in acids. It can be separated from these metals by fusion with chloride of sodium and precipitation by chloride of ammonium in excess. It has been recently found that the fusing-point of iridium can be lowered by the addition of a small proportion of phosphorus, without injuring the other properties of the metal, and this application may bring it into more extended use. It has also been suggested for plating the interior of vessels used in contact with acids.

IRIS is a genus of plants belonging to the order IRIDÆE. The species are commonly known as "flags." The flowers are generally large and showy, and great favourites in the garden. The three outer segments of the petaloid perianth are bent back, the three inner are erect, and the three stigmas are petal-like. The species (about 100 in number) are chiefly natives of Southern Europe and Northern Asia, a few extending to North America and North Africa. There are two native species, the Yellow Flag (*Iris Pseudacorus*), with roundish stem, and inner segments of the perianth shorter than the stigmas; and the Gladdon (*Iris fetidissima*), with compressed stem, inner segments equalling the stigmas, and colour generally bluish. The rhizome of the yellow flag possesses astringent properties. The White Flag (*Iris florentina*) has large white flowers; the rhizome is known as Orris-root. The rhizome of the Blue Flag (*Iris versicolor*) of North America has purgative properties. The Iris is the fleur-de-lis, the emblem of France.

IRIS, in the Greek mythology, was the goddess-messenger of the greater divinities. Her path as she flew in the storms, bearing the commands of Zeus, was marked by the rainbow. She travelled with lightning speed. She silently charged the clouds with water from the seas and rivers, and on her glowing rainbow path she carried out the behests of Zeus, directing the outflow upon the thirsty fields. The farmer therefore built altars to her, and worshipped the many-coloured arch which signalled her presence.

IRISH DIAMOND is a name often applied to the



Group of Irish Diamonds.

clear, transparent, well-formed crystals of quartz also called *Bristol Diamonds* or *Cornish Diamonds*.

IRISH ELK. See MEGACEROS.

IRISH LANGUAGE AND LITERATURE.

Ancient Irish, or Erse, is the older branch of the living Gadhelic tongues, the Gaelic of Scotland being the younger; and the Gadhelic is the more ancient class of the Celtic tongues, the Cymric (Welsh, &c.) being the younger. The most ancient relics of Erse are, with all tongues, the monumental inscriptions, but there are some extremely ancient written memorials. Of these the first are the *glosses* or explanatory notes and translations of words or phrases with which early Irish piety accompanied the transcription of the Latin service books, Bibles, &c., of the Church of Rome. It is admitted by all that the earliest glosses are certainly 1100 or 1200 years old (of the eighth or even the seventh century, namely), which is certainly remarkable. A fine collection was published in 1860 by the Irish Archæological Society. Of entire manuscripts the oldest existing are not the oldest compositions. The "Book of Armagh," it is true, dates back to the beginning of the ninth century, but it contains matter composed in the fifth century, with the contemporary "Latin Testament" and "Confession" of St. Patrick. The "Leabhar na h-uídhre," as late in our earliest copy as the eleventh century, is a collection of bardic tales of the fifth and sixth centuries. The "Annals of Tighearnach," though of respectable antiquity, are copies of works beginning with Cimbay in B.C. 299, and were compiled certainly as early as the fifth century; and the same may be said of the "Annals of Ulster," though our earliest copy is of the middle of the sixteenth century.

Other parts of this great wealth of Celtic antiquities are the "Book of Leinster" in a MS. of 1150 at Trinity College, Dublin; the "Book of Leaghan" in Sligo, in a bardic MS. of 1116; the "Book of Ballymote" in the MS. of rather earlier date at the Royal Irish Academy, Dublin; and the MS. of a century later at the same place of the "Annals of Connacht" (Connaught). The MS. Martyrologies of Tallaght (tenth century) and O'Gorman (twelfth century), and the priceless relic of the Brehon Laws in a MS. of the fourteenth century ("Seanghus Mor," The Great Law), which explains to us all those peculiarities of Irish tribal and land customs whose later developments are else inexplicable, are other authentic ancient documents. Besides these there are many lesser bardic accounts of special families, all dealing with wars of the heroes and genealogies reaching back to the beginning of the world, tracing the origin and development of the special tribes whose glories they celebrate. In the times of Elizabeth and James I. a revival seems to have taken place, and original Erse works were freely produced. Spenser, who lived long in Ireland and wrote the "Faerie Queene" there, speaks of the beauty of the Irish poetry of his time, and Keating wrote in Erse an important Irish history up to the Anglo-Norman invasion, preserving intact many then existent sources by his quotations, which have since disappeared utterly. The Franciscan monastery of Donegal contained four brothers, O'Clerigh (O'Clery), who wrote between them the famous "Annals of the Four Masters," a history of Ulster and Connaught from the year of the world 2242 down to 1616 A.D. In fact, all through the seventeenth century Erse was a thoroughly literary language. But with the eighteenth century it fell into disuse in literature, and it became even difficult to find Erse scholarship enough to correct reprints, though as a spoken language it of course remained vigorous among the native Irish. This state of decadence remained for a century or a century and a half. The foundation of the Irish Ordnance Survey in 1830 powerfully assisted a growing interest in ancient records; the government actively promoted national scholarship, and a numerous body of Celtic scholars has since grown up. Irish antiquities are now most thoroughly studied, with great and increasing results. Many of the oldest Irish works are published by the government in the Rolls Series; and newspapers are printed in Erse, and printed in that antique Roman character of the fourth century which, from its present limitation to Celtic works, is called (most incorrectly) the "Celtic character." The numerous Irish emigrants of America are flattered by songs and stories being produced in the journals of their adopted country in their national language and Celtic type, but after all these are mere literary toys. As a literary language probably Erse is dead.

The construction of Erse is extremely complicated, and so diverse from either the Teutonic or the classic tongues that it would be impossible properly to represent its structure here. It may be mentioned that Erse has no indefinite article; and though there are signs of an ancient neuter, in the form of the language which we know all nouns are masculine or feminine. The metres are exceedingly difficult, and every now and then throw scholars into conflict; the crux lies in the very unsettled state of the accentuation of the ancient words, to which the modern popular form gives scarcely any reliable clue. The best modern work in this thorny topic is "L'Accentuation de l'Ancien Verbe Irlandais" by Thurneysen (Paris, 1884); Professor Zimmer's "Keltische Studien" (Berlin, 1884) has also thrown great light on accentuation. The "Irish Grammar" of O'Donovan (Dublin, 1846) is one of the most valuable of that ardent scholar's contributions to the study of Erse. It has since been superseded by the magnificent work of Windisch.

IRISH MOSS. See CARRAGEEN MOSS.

IRISH MUSIC. A very ancient and a very beautiful school of music has been preserved by the continuance, of the tribal harpers down to historic times. Giraldus Cambrensis, himself a "barry," accompanied Henry II. into Ireland, and wrote a famous account of the expedition, and his praises of the native music and musicians are most glowing. The tradition being so unbroken we may reasonably take the collections noted down in the early part of the eighteenth century as authentic. One of the best is that of the great harper Carolan, whose son published it in 1747. Carolan was himself an excellent composer, and indeed the cultivation of harp playing during the whole of the eighteenth century was extremely refined and thorough. In 1792 a large number of harpists met at Belfast, ten of whom were critically examined by the musician Bunting, who found them agree remarkably in nearly every point of their art, even to the occasional use of the finger nails in performance, &c., though they came from all parts of the country. From the playing of these ten he wrote down very carefully a large number of tunes, which he published in 1796, and subsequently somewhat added to.

The melodies are often of the very highest beauty, and are many of them written in various modes of the key of G. This gives in one particular and favourite mode that Gaelic peculiarity which is perhaps still more familiar to us in Scotch music, the apparent omission, or rare use, of the fourth and seventh of the normal scale. Tunes played entirely on the black notes of the pianoforte produce a similar effect. A close by falling to the submediant and rising thence to the tonic, and a reiteration of the concluding note, are two other peculiarities very common in Irish music. Thomas Moore, the poet, says of it as a general feature, "We find some melancholy note intrude, some minor Third or flat Seventh, which throws its shade as it passes, and makes even mirth interesting." Moore wrote some 125 exquisite little lyrics to these melodies between 1807 and 1834. So firmly have his beautifully appropriate lines clung to the tunes that the name "Moore's Melodies" has probably now become inseparable from them. "The Minstrel Boy," "The Last Rose of Summer," "The Harp that once," &c., such are the names and such are the forms by which the celebrated airs are now universally known. It is to be regretted, however, that many of the airs are slightly altered, the better to suit the lyrics. Some of them are so ancient as to have a Scotch and Irish double-version, evidently due to the time of the early Scoto-Irish invasions of Caledonia—for it must never be forgotten that Ireland, not Scotland, was the original Scotia.

IRISH SOCIETY. James I., desiring to colonize Ulster, gave large grants of land there to London citizens, who were incorporated as the Irish Society in 1619. They fortified Derry city and made it the strongest place in the north; eventually changing its name to Londonderry, which it still retains. The charter of the Irish Society was cancelled in 1637 under the stern rule of Wentworth, afterwards Earl of Strafford. Charles II. renewed it in 1662 with considerable additions. Though it is not technically a corporation property, yet the members of the Irish Society are all members of the corporation of London, twenty-six in number, elected by the common council, half of them retiring each year. Both in agriculture and linen manufacture Londonderry county stands at the head of Ireland, while its roads, bridges, public buildings, &c., are far beyond anything else in the island except at Dublin. The policy of the corporation has been to spend the whole income upon the maintenance and improvement of the estate; but it must be admitted that many handsome salaries are included in these items. Altogether the Irish Society is probably the best landlord in Ireland.

IRITIS is the name given in medicine to inflammation of the iris. [See EYE.] It is usually of the adhesive kind, and the effusions of lymph cause the margin of the

pupil to become fastened in places to the anterior capsule of the crystalline lens. It is a serious affection, for if neglected or improperly treated it may result in permanent blindness. The most common causes of this complaint are sudden changes from heat to cold, or the exposure of the eye to a draught of cold air; over-exertion of the eye; actual injury, and it occurs as a concomitant of other diseases of the eyeball; lastly, it may arise from a disordered state of the constitution arising from such diseases as syphilis, scrofula, gout, and rheumatism.

The external symptoms of this affection are redness of the eye, discoloration of the iris, and irregularity in the movements of the pupil. There is at the same time dimness of sight, an intolerance of light and pain in and around the eye, though the latter is an uncertain symptom.

Treatment consists in the dilation of the pupil by means of a watery solution of atropine so as to prevent the formation of adhesions or to break them if already formed, and in mild cases this may be sufficient of itself to effect a cure. In other cases mercury must be administered in such a form as will quickly affect the system, and the administration must be continued until a slight line is formed upon the gums, when the dose should be lessened. By that time, in favourable cases, a manifest change for the better will have been produced. During treatment the other eye must be carefully rested, and if there is sensitiveness to light a protective bandage should be worn. Bleeding and the use of counter-irritants are sometimes useful, and where there is much pain a little opium may be continued with the mercury, or a subcutaneous injection of morphia may be used. If the adhesions do not disappear after treatment, and there is a return of the disease, recourse must be had to a surgical operation.

IRKUTSK, a town of Russia in Siberia, capital of the government of the same name, situated on the Angara, at the infall of the river Irkut, about 30 miles from the north-west shore of Lake Baikal; elevation, 1237 feet. The Angara divides it into two nearly equal parts, and is here 1000 feet wide. Its chief buildings are a cathedral and great number of other churches, two convents, an exchange built of stone, a medical college and some other schools, a gymnasium, a workhouse, and two hospitals. The town has manufactures of linen, cloth, hats, leather, woollens, soap, and glass; it has also some distilleries. The population is about 30,000.

IRMIN STREET or **ERMIN STREET**, one of the four great Roman roads in Britain, derived its name from the Teutonic hero Irmin. It led directly from London to Lincoln, with a branch to York by Doncaster, and later on another through Cleveland to the "Wall's End" or Segedunum on the Tyne. Smaller branches crossed the fens to Norwich and to Colchester; and it joined the Ikenild Way at Royston. A cross road ran from the Potteries or Durobrivum (Water Newton on the Nen) to Durocornovium, the modern Cirencester in Gloucestershire.

IRMINSUL, the column (*saule*) of a prehistoric hero, Irmin of the ancient Teutons, held in the greatest reverence, though the reason of this is as yet undiscoverable. Charles the Great in his mission of Christianizing the old Saxons by the force of fire and sword destroyed the Irmisul (A.D. 772), since it seemed to him a sort of mysterious idol. The later national name of Hermann, and the ancient **IRMIN STREET** of England, also point to the same hero.

IRON (Latin, *ferrum*; French, *fer*; German, *eisen*; Italian, *ferro*), one of the most useful of the metals and of the highest industrial value, is of a bluish-gray colour, but acquires lustre by polishing. Its fracture is either fibrous or crystalline, according as it is broken either slowly or quickly, and of the ductile metals it is the hardest and toughest. It cannot be hammered into very thin plates, but may be rolled out into sheets of astonishing thinness, or drawn out into very thin wire.

The iron of commerce is seldom or never pure, but contains small portions of sulphur, carbon, silicon, phosphorus, arsenic, &c.; its density varies a little according to its purity and the method of its manufacture, and is increased by rolling and drawing into wire. Purified by fusion with sinithy scales, it showed in some experiments a specific gravity of 7.8439. Pure soft bar iron, with only a trace of carbon, has a density of 7.79; that of ordinary bar iron is 7.788.

When iron is subjected to a red heat it softens and becomes tough, a quality which increases its value in the manufacturing arts; and its faculty of welding or uniting at a white heat, renders it more easily workable than any other metal; when heated above the welding point it burns, and afterwards crumbles under the strokes of the hammer.

The point at which iron melts is variously estimated by different authorities. Mackenzie places it at 158° Wedgwood; Morveau at 175° Wedgwood, or 6136° Centigrade; and Daniell at 1587° Centigrade. The melting point will vary considerably with the proportion of carbon present, being comparatively low when the proportion of carbon is high. The presence of phosphorus and other impurities also lowers the melting point. It is the opinion of Professor W. Chandler Roberts, that the temperature given by Wertheim or by Karmarsch—viz. 1200° C. (2200° Fahr.)—can only be considered to be a rough approximation.

The effects attendant on the induction of magnetism on iron are of a temporary nature. Magnetism may be induced on steel, but the induction proceeds very slowly, and is at first much more feeble than it is with iron. On the other hand, steel does not, like iron, lose what it has acquired, for on the removal of the magnet which gave it the magnetic property, it retains this property permanently: it has, in fact, become itself a real magnet.

Historical Notice.—Whatever may have been the characteristics of the mythic age of gold, it is certain that man could maintain a high degree of civilization only in an age of iron; for without committing ourselves to the popular belief in a succession of ages, progressing from the time when only flint or stone implements were used, to the bronze, and finally to the iron period, we may yet fully acknowledge that the possession of iron in abundance by any people is equivalent to their advancement in all those arts and sciences which promote the happiness of the many, while leading to the enrichment of the few. It may be for this reason that iron is one of the earliest metals mentioned in history, and it must not be forgotten that although the modern manufacture of wrought iron involves some difficult operations, yet masses of malleable iron may be produced from some ores by the action of heat alone in presence of a flux and by means of apparatus of the simplest description. In the most ancient books of holy writ reference is constantly made to weapons and implements fabricated from this valuable metal, and it is certain that iron furnaces were generally in use in ancient Egypt. It is evident that the pyramids, and similar colossal works, could never have been executed without the assistance of iron tools, and in fact there is a specimen now in the British Museum of a plate of malleable iron which was found embedded in the solid masonry of the pyramid of Ghizeh, and was removed by blasting the stonework in which it had been preserved.

We gather from Homer some idea of the value which the Greeks of his era set upon the metal, for a mass of iron is one of the prizes at the funeral games which Achilles celebrated in honour of Patroclus; but the iron there spoken of was an imperfectly malleable metal produced at once from the ores in the furnace. The ore was probably obtained through the Phœnicians, from Laconia and the shores of the Black Sea. Diodorus Siculus refers to Elba as furnishing iron ore, which the natives dug out of the ground,

and then melted to obtain the metal. Pliny, in his "Natural History," describes its manufacture at considerable length, and the various uses to which it was applied. It should be noted that though the Latin writers apply the word *ferrum* (iron) to a sword, the weapons and cutting instruments discovered among the ruins of Pompeii and Herculaneum are almost invariably formed of bronze.

This, however, in no way necessitates the belief that the inhabitants of these places were unacquainted with iron, for it is only necessary to refer to the property which that metal possesses of rapidly oxidizing by exposure to air in order to be convinced that unless favoured by some exceptional conditions of preservation no specimen of iron from distant epochs could have come down to us in the metallic state.

Nothing, perhaps, is more remarkable in the history of iron manufacture than the slowness with which it was developed in England. Iron was mined and smelted in our island in the time of the Romans, but for some centuries afterwards our English mines were left wholly unworked; and so precious was the metal esteemed that Edward III. included the pots and pans of the royal kitchen among his Majesty's jewels. The Spaniards, in designing the Armada, calculated on the superior excellence and abundance of Spanish iron compared with English as an important element of success. In the fourteenth and fifteenth centuries we were supplied with iron and steel from Spain and Germany; while as late as the middle of the eighteenth century, we imported from Sweden no less than four-fifths of the iron used in this country.

This neglect of what is now one of the principal sources of our national wealth was owing to the enormous consumption of timber as fuel rendered necessary by the old smelting processes. The charcoal required to produce a single ton of pig iron represented four loads of wood, and for a ton of bar iron seven loads of wood. The iron manufacture then was confined to the counties of Kent, Surrey, and Sussex—that is, to the neighbourhood of the Weald or "wooded country," and it threatened to sweep away the forests which were once its glory and its wealth.

The rise of the English iron manufacture, as a staple of national wealth, dates from the employment of coal in the smelting operations. The first who attempted it was a German, named Simon Sturtevant; but his process, theoretically correct, proved a failure in application. Dud Dudley, an enterprising Worcestershire ironmaster, was more successful, and in February, 1620, applied for a patent for his invention, which was granted for thirty-one years. In due time the process was introduced by a Quaker, named Abraham Darby, at the celebrated Colebrookdale Works, in the valley of the Severn. It was a grandson of this enterprising person who designed and erected the first iron bridge in England.

The change from charcoal to coke as a fuel necessitated a more powerful blast, and a longer subjection of the materials to the heat. The latter was effected by enlarging the height of the furnace, and the former by substituting for the common forge bellows large cylinders with closely-fitting pistons. The earliest blowing cylinders of any magnitude were erected by the celebrated Smeaton at the Carron Ironworks in 1760. These improvements produced an astonishing increase in the quantity of iron manufactured.

In 1806 there existed 227 blast furnaces in this country, 159 of which were in active blast at once, and yielded 250,000 tons of iron. In 1880 the furnaces had increased to 600, and the quantity of pig iron produced yearly to about 6,000,000 tons. In 1884 there were in the United Kingdom 475 furnaces in blast, 421 blown out, four being rebuilt or repaired, and four being built—the total production of pig iron for the year 1883 having been 8,529,300 tons, and for the year 1884, 7,528,966 tons.

The following was the quantity and estimated value in the years from 1870 to 1884:—

	Pig Iron.	Value at the Place of Production.
	Tons.	£
1870,	5,963,515	14,908,787
1871,	6,627,179	16,667,947
1872,	6,741,929	18,540,304
1873,	6,566,451	18,057,739
1874,	5,991,408	16,476,372
1875,	6,365,462	15,645,774
1876,	6,555,967	16,062,192
1877,	6,608,664	16,191,236
1878,	6,381,051	16,154,992
1879,	5,995,337	14,788,342
1880,	7,749,233	19,378,082
1881,	8,111,449	20,361,122
1882,	8,586,680	24,042,704
1883,	8,529,300	22,176,000
1884,	7,528,966	—

Nearly contemporaneous with the earliest improvements in the manufacture of cast iron by means of pit coal were others of an equally important kind for the conversion of cast iron into malleable or bar iron. In 1783 Mr. Richard Cort—one of the most illustrious names in the history of iron manufacture—succeeded in converting cast iron into malleable iron by the employment of pit coal in a reverberatory instead of a blast furnace, and thus introduced what is known as the *puddling process*.

The general introduction of the steam-engine, as improved by Watt, also gave a great impetus to the development of iron manufacture. It enabled mines to be sunk to a greater depth, and facilitated the process of raising the coal and ore, while its employment for the purpose of locomotion has effected astonishing changes.

Finally, the introduction of hot-blast, the invention of Neilson, in 1828, by which an undoubted saving of fuel was effected, as well as increased powers of production afforded, in the manufacture of iron; the Bessemer process, which gave great facilities for the conversion of iron into steel; and the Thomas-Gilchrist process, which rendered inferior qualities of pig iron available for conversion into steel, mark the great eras in the history of iron this century.

Ores of Iron.—We now proceed to a brief examination of the various sources from which iron is obtained:—

Native iron was for a long time unknown, and even its existence doubted; but nevertheless it has been found in several localities, both on the Continent of Europe and in America. Native iron is almost pure white, more resembling silver than ordinary iron, is generally softer and less dense, and, unlike meteoric iron, contains no nickel. A mass was found at Gross Ramsdorf in Thuringia, which, according to Klaproth, yielded the following constituents: Iron, 92.5; lead, 6.0; copper, 1.5 = 100 parts.

In Siberia it is found in considerable quantities; and as it is soft and flexible, and easily cut with a chisel, the natives use it for implements. It contains 98.48 parts of iron and 1.60 of silica.

Meteoric Iron.—Nothing is known certainly of the history and origin of those large masses of iron found in localities where no ferruginous strata exist, but they are generally supposed to have fallen from the atmosphere, and accordingly are designated *meteorites*. They are generally covered with a kind of black enamel, which protects the metal from the atmospheric action, and the iron usually forms a species of network round a crystallized metallic mineral, containing various ingredients, such as iron, nickel, cobalt, copper and tin, manganese, phosphorus, silica, alumina, potassium, magnesia, soda, carbon, sulphur, &c.

Magnetic Iron Ore.—This is formed by a combination of the protoxide with the peroxide of the metal; has a

black colour, and is hard, crystalline, and arenaceous. It exists abundantly in different rocks—in granite, hornblende, mica-slate, clay-slate, syenite, chlorite, and most of the limestone formations. Almost all the Swedish iron is manufactured from this compound, which also abounds in the United States of America.

Specular or micaceous iron ore, or red hematite, occurs in masses and crystalline—the crystals attached; the primary form a rhomboid; colour bluish-gray, with slightly iridescent surface. Of late years hematite ore (particularly that of Cumberland), and iron made from it, have had an increasing value, on account of their purity.

Bog iron ore is amorphous, with a vitreous lustre and a yellowish or dark-brown colour; belongs to very recent formations, and appears to arise from the decomposition of certain rocks by running water. Hence it derives its name from being always found in low, marshy localities.

Iron pyrites occur in many forms, but always consist of combinations of iron and sulphur. They vary in tint according to their exposure, from a yellow bronze to a silver white. Their crystals are beautiful cubical and octahedral figures. Arsenical iron pyrites, or *mispickel*, is found abundantly in Cornwall and on the Continent, and frequently associated with other metals, such as tin. When struck by a hammer or rubbed on any hard or heated surface, it emits a strong garlic-like smell.

Carbonaceous iron ore is the most common of the British ores, and most of the British iron is manufactured from it. It chiefly consists of a carbonate found in beds in the coal formation, frequently alternating with the seams from which the coal is taken. These deposits in Britain occur at Cleveland and Dudley, in England, in Lanarkshire and Ayrshire in Scotland, and in different parts of Wales. Of these ores we note two principal varieties:—First, the argillaceous or clayband which, as it contains a large admixture of earthy matter or clay, yields, when wrought alone, a weak and inferior kind of iron. It presents a dark gray colour, nearly black, and its specific gravity varies from 3.17 to 3.41. The second variety of this ore, blackband, was for a long time unknown, and was first pointed out by Mr. Mushet. It contains less earthy matter than the clayband, and is much blacker in appearance.

Iron froth consists of very thin, brownish-red, scaly particles, which stain the fingers and have a saponaceous feel. The massive varieties are amorphous; the structure foliated.

Hydrous oxide of iron, brown iron ore, or brown hematite occurs in aggregated crystals and massive prisms. Primary form a right rhombic prism; colour brownish. The massive varieties are globular and reniform; some of the varieties constitute brown clay ironstone.

Compounds of Iron.—Oxygen and iron combine to produce three or four bodies. The protoxide or ferrous oxide is tasteless, black, insoluble in water, readily dissolved by most acids, and easily affected by the magnet. The magnetic oxide is also black, obeys the magnet, brittle, easily reduced to powder, and in water insoluble. The peroxide or sesquioxide, or ferric oxide, constitutes the common rust of iron; colour red; is inodorous, tasteless, insoluble in water, and forms red solutions with acids.

Carbon and iron form the combination which is by far the most widely known. In different proportions carbon imparts various degrees of hardness and fusibility to iron, and gives thus a wide range of qualities, which can be traced from the softest steel on the one hand, to the hardest cast iron on the other. Attempts have been made to fix a scientific basis for the nomenclature of iron and steel, according to the proportion of carbon in combination with the metal, but without success; and the practice of engineers and manufacturers still is to include under the general denomination of steel all compounds consisting chiefly of iron which have been produced through fusion

and are malleable. The property of welding and tempering used to be the distinguishing mark of steel, but modern processes have introduced a wide variety of materials, ranging from the softness and toughness of malleable iron to the hardness of the hardest tool steel. While it is usual to designate exclusively as steel the combination of iron with a small proportion of carbon, the term is occasionally applied also to other combinations of iron in which the small amount of carbon is replaced by some other element, as, for instance, titanium, chromium, &c.

Potassium and iron, and sodium and iron combine when heat is applied to them; the alloys are more fusible than pure iron, especially when in contact with the air. These alloys are decomposed by air and water. Silicon when combined with iron induces hardness and brittleness, which, however, are generally counteracted by the presence of other matters, as, e.g. carbon, manganese, &c. All pig iron contains silicon. Arsenic and iron form an alloy which has a grayish-white colour, does not obey the magnet, is very brittle, and much more fusible than iron. Other alloys with arsenic may be formed. Chromium and iron form an alloy which has lately become known as chrome steel. With columbium a hard brown alloy is formed. Zinc gives a white and brittle alloy with iron. Tin and iron form the alloy seen on tin-plate ware. Antimony and iron unite when heated together in close vessels; the alloy is white, hard, brittle, and its specific gravity is less than that of the mean of the two metals. No metal appears to deprive iron of its magnetic property more than antimony does. Cobalt and iron form a hard magnetic alloy. Nickel and iron form the meteoric alloy. Bismuth combines with difficulty with iron. Molybdenum forms with it a bluish-gray brittle alloy. The alloy of copper and iron is magnetic. Silver combines readily with iron when they are fused together, but they separate on solidification, and globules of silver appear on the surface of the iron. With mercury a white tenacious alloy is formed. Lead and iron combine with difficulty. Rhodium, iridium, and platinum may all be made to form alloys with iron. Lately attempts have been made to form titanium steel, and Mr. R. Mushet has introduced under the name of special steel a combination of iron and tungsten. Gold and iron combine with facility. A compound of eleven parts of gold and one part of iron is nearly white. It is very ductile, and its specific gravity is 16.885. An alloy of three parts of iron and one part of gold is of a silver colour, and is attracted by the magnet. With manganese iron forms alloys which have become of great value and importance in steel making.

Oxidized iron is, speaking popularly, rusted iron. Professor Barff, however, discovered a process of coating iron with a magnetic oxide which renders the surface impervious to the change and decay involved by rust. By exposing iron for a certain time to the action of superheated steam it becomes coated with a kind of enamel, of a dark-grayish, glazed appearance. This is due to its acquiring a tenaciously adherent coating of magnetic oxide, which has the property of permanently preserving the material operated upon. Mr. A. S. Bower, whose name is now connected with the Barff process, patented the employment of a special furnace, in which atmospheric air was to be the agent in the production of this coating of oxide, but it is probable that the results obtained by him were due to the action of the water vapour which is always present in air.

Sulphate of iron, or ferrous sulphate, is largely made use of for various purposes, especially for dyeing black. It is generally known as copperas or green vitriol. The primary form of the crystal is an oblique rhombic prism; its colour bluish-green when recently prepared; but by exposure to the air, and the partial peroxidization of the iron, it changes to green, and then to a dull yellow. Like the other salts of iron it has a disagreeable styptic taste.

The sulphate of peroxide of iron or ferric sulphate represents the soluble salts of peroxide of this metal. When concentrated its colour is reddish, when diluted yellowish. No crystals are yielded by evaporation, but a brown deliquescent mass is deposited; its taste is very astringent, and it dissolves in alcohol.

There are two *nitrate*s of iron—a pale green proto-nitrate resulting from the action of very dilute nitric acid, and pernitrates when the acid is very moderately diluted.

Carbonate of iron is the protoxide combined with carbonic acid so as to form a solid. It is the basis of what is termed the argillaceous iron ore, and sometimes occurs pure in transparent rhombic crystals.

Phosphate of Iron.—The protophosphate occurs in Cornwall, America, &c., as a greenish, oblique, rhombic, prismatic crystal; it may also be prepared artificially as a blue precipitate. The perphosphate is white; it is obtained by adding phosphate of soda to persulphate of iron. Like the protophosphate, acids, but not water, will dissolve it, and from them it may be precipitated unaltered.

Arseniate of Iron.—The protoarseniate is a grayish precipitate, which upon exposure to the atmosphere absorbs oxygen and becomes darker. The perarseniate is a pale yellow powder, insoluble.

Chromate of Iron. See CHROMIUM.

IRON MANUFACTURE AND TRADE.—Under this general denomination are included the three varieties of the metal, viz., pig iron, malleable or bar iron, and steel.

The first process of manufacture is that of reducing the ironstone or ore, or, as it is technically called, the mine, into a metallic state by means of carbon, and the subsequent melting of the iron so reduced. This operation is conducted in a blast or smelting furnace [see BLAST FURNACE], charged from the top with certain proportions of iron ore, coke or coal, and limestone, the ore having been previously roasted in a kiln, or in heaps, in order to drive off its combined water and moisture, a portion of any sulphur or other volatile impurity it may contain, and to reduce the compounds of iron it contains to the state of ferric oxide—a process by which it loses one-sixth part of its weight.

Many different sizes of blast furnace have been tried, ranging from 48 feet in height, with a cubic capacity of 6000 cubic feet, to 103 feet in height and 41,000 cubic feet capacity. It was found that by increasing the size from 48 to 80 feet, and the capacity from 6000 to 12,000 cubic feet, there was a marked economy of fuel obtained per ton of iron made, and the weekly make of iron rose from 220 to 260 tons. It was supposed that the same rate of economy of production would accompany further increase of size, but this was found in practice not to hold good, the weekly make of a furnace of 103 feet in height having been only 550 tons, which was attained by a furnace 80 feet high and 25,500 cubic feet capacity. For 6 tons yield many furnaces are charged

progressively with 15 tons of roasted iron ore, 22 tons of coke, and about 6 tons of limestone. But the exact proportions of the materials put into the blast furnace differ in every locality and with every change of ore or coal. The temperature of the blast used also produces a considerable difference of effect in the working of blast furnaces; but the saving in fuel realized by the use of a very hot blast is not very marked at temperatures above 1000° Fahr.

The iron as reduced in the smelting furnace (known now as cast or pig iron) is not malleable; that is, it is not capable of being hammered or rolled, owing to the large amount of impurities it contains—chiefly carbon, sulphur, silicon, and phosphorus. The presence of sulphur renders it what is technically called “red short,” or brittle under the hammer while hot; and the presence of phosphorus renders it

Fig. 1.

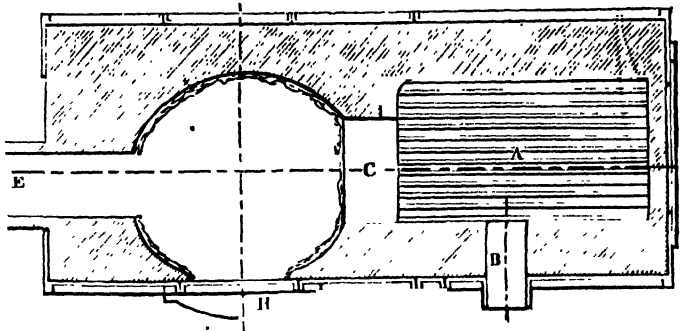
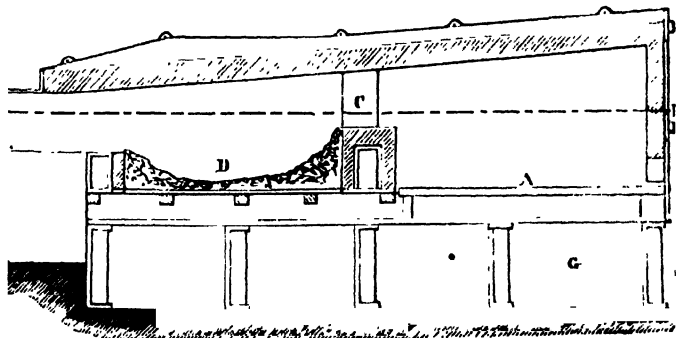


Fig. 2.



“cold short,” or brittle at ordinary temperatures. At the first few blows of the hammer the metal would fly to pieces, and the extraneous matters must therefore be removed before the iron can be rendered malleable, so that it may be forged, welded, or otherwise dealt with as may be desired. Nevertheless, as pig iron it occupies a most important place among the products of the world, and is the raw material for ironfounders, who remelt it in cupola furnaces, with coke for fuel and a fan blast, and run it from ladles into moulds prepared in sand or loam, sometimes iron, whence it issues in the thousands of useful forms in which, as castings, it is necessary that iron should be obtained.

To effect the transition of cast or pig iron into malleable is the object of puddling, a process invented by Mr. Henry Cort in 1784, after many other attempts had failed. The great iron industries which have added so enormously to the wealth of this and other countries, and which have been attended with important and beneficial results to

every civilized human being, owe their development to the puddling furnace of Mr. Cort. As the demand for iron increased with the spread of railways, the carrying out of large constructional works, and the extension of iron ship-building, the puddling process attained its meridian in the United Kingdom.

The method devised by Mr. Cort consists in placing the metal to be puddled on the hearth of a reverberatory furnace (figs. 1 and 2), in which the fire, A, is separated from the hearth, D, by a low partition or bridge, C. By this arrangement the flame is conducted over the surface of the metal, creating an intense heat, while the bridge prevents the deleterious portions of the fuel mixing with the iron. The highly-heated products of combustion, with a surplus of oxygen, play upon the surface of the molten metal and effect its conversion, passing thence to a chimney, over which a damper, formed of a metal plate, is suspended, by means of which the draught is regulated. The body of the furnace is so constructed that a stream of water or air circulates under the bottom and frequently through the bridge, and thus retards the deterioration of the materials composing them by the intense heat to which they are subjected. The puddler effects his operations through a door, H, opening on to the molten iron, and his work is to agitate the metal so as to expose the whole of the charge to the action of the oxygen passing over it from the fire, and thus to burn out the impurities. This he does with an iron tool called a rabble, and with which, after the iron has passed through certain phases, he collects the metallic granules or particles and rolls them together over the hearth in balls or blooms, measuring roughly 14 inches in diameter. These blooms he afterwards removes from the furnace, and they are then subjected to either hammering or rolling, which gives the iron homogeneity and fibre.

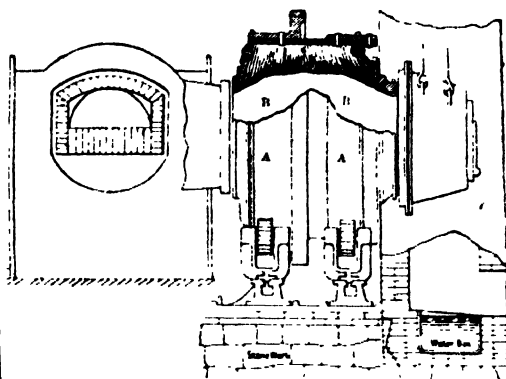
The different qualities of iron, varying according to the purpose for which the metal may be required, are due to the varying degrees of care and perfection with which puddling is carried out. The manual labour involved by the process is among the hardest and most exhausting voluntarily undertaken by man. Mechanical puddling has of late years taken the place of hand labour to some extent, but the process is expensive, and puddling itself is rapidly declining since the rise of the Bessemer and Thomas-Gilchrist and the Siemens processes of steel-making, described further on in the present article. The most notable and successful of the plans of mechanical puddling proposed is that of Danks of Cincinnati, who employs a revolving chamber, illustrated in figs. 3 and 4. This chamber, A, is lined with refractory material and tuffing at B, like the bath of an ordinary puddling furnace, and is revolved by an engine, C, and gearing, D. After many difficulties experienced in working out this process, and its abandonment by several iron makers in this country, it is now considered to be quite successful, and is in operation in two extensive ironworks in England, and in France, where it is found that the iron produced by the revolving furnace is superior in quality to that from hand-worked furnaces, and that there is also an advantage in point of yield.

Rolling the Iron.—After the balls of iron, or blooms, have been removed from the puddling furnace, and subjected to ten or twenty blows from a heavy steam hammer, which process is termed shingling, they are passed through the rollers. The shingling hammer weighs from 40 to 50 cwt. The rollers (shown in Plate I.) consist of two cylinders worked in contact, and having on their surfaces a series of grooves, varying in size. Through these grooves the shingled bar is successively passed, until reduced to the requisite width and thickness, water meanwhile playing upon each pair of rollers to keep them cool. The iron has now been converted into a tough elastic bar, which, from the facility with which its form is changed

under the hammer, has acquired the name of malleable iron.

Sheet iron is made by passing the metal between smooth rollers, without grooves, the rollers being gradually screwed nearer together as the requisite thickness is approximated. The speed of the different kinds of rolling-mills varies according to the character of their work. Those for merchant bars make from sixty to seventy revolutions a minute, while those of large size for boiler plates are reduced to twenty-eight or thirty. Others, such as the

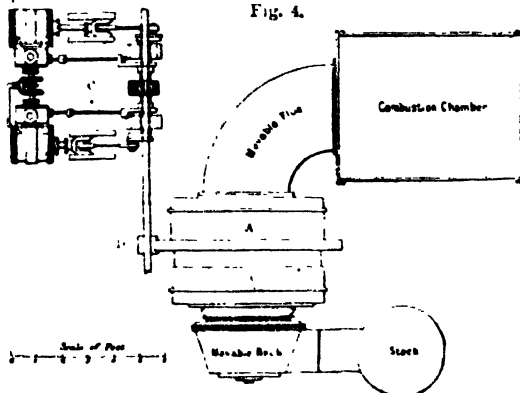
Fig. 3.



finishing rollers, in which the shape and size of the bars are finally determined, run at from 120 to 100 revolutions. Plate I. gives a plan of a rolling-mill, and details of rolls used for rail making.

Conversion of Iron into Steel. Bessemer's Process.—What is termed steel is, roughly speaking, iron with a small proportion of carbon in it. Originally, in its condition as cast iron or pig, there may have been not only a large quantity of carbon, but various other impurities, such as silicon, sulphur, phosphorus, &c. It is the large proportion of carbon and the silicon in cast iron which give to

Fig. 4.

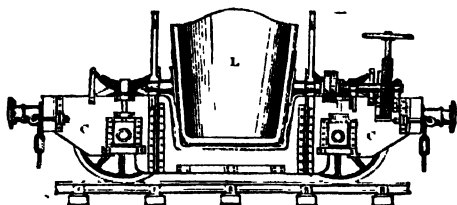


it the essential characteristic of being easily fusible: while to the presence of sulphur, phosphorus, &c., is due the fact of its being so brittle as to be unworkable under the hammer, and that it possesses but a small degree of tenacity under any circumstances. If the carbon is reduced, by puddling or other means, and the other impurities eliminated, the metal remaining is wrought iron, which is practically infusible, but may be worked with great facility under the hammer, and can be more or less firmly united by welding. The hammering and rolling to which it is subjected confer upon it a fibrous structure, so that its strength, like that

of wood, is generally greater in one direction than another. When the quantity of carbon is made extremely small, the other impurities being removed, it acquires new and very important qualities. It then combines the fusibility of cast iron with the malleability, and with much more than the strength and tenacity, of wrought iron, and in this condition it receives the name of steel.

In former times steel was a costly product, manufactured in small quantities in crucibles by what was almost a laboratory process, and was used only for tools, cutlery, and like purposes. The cost of steel, by the time all the various impurities had been expelled from the metal or reduced to the necessary minimum, was between £50 and £60 per ton; but we have now to explain a process invented by Sir Henry Bessemer for the manufacture of

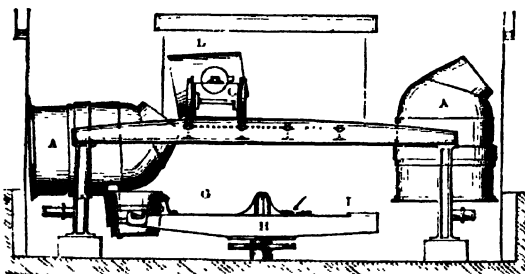
Fig. 5.



steel, by which its cost was reduced to about one-tenth of these amounts. It is an operation which dispenses with puddling altogether, for the pig iron is poured from the smelting furnace, or from a cupola if remelted, into a converter, and the Bessemer process consists in burning out the sulphur, carbon, and silicon in cast iron, by passing a blast of atmospheric air through the molten metal, and then adding such a quantity of a pure cast iron containing manganese to the wrought iron thus prepared as is necessary to give carbon enough to convert the whole mass into steel. In this way 10 tons of crude iron may be converted into cast steel in less than thirty minutes after being melted, and at a very small expenditure of fuel.

The simplest forms of Bessemer's apparatus are illustrated in Plate II. Pig iron, containing perhaps 5 per cent. of carbon, is melted in a reverberatory, or more usually

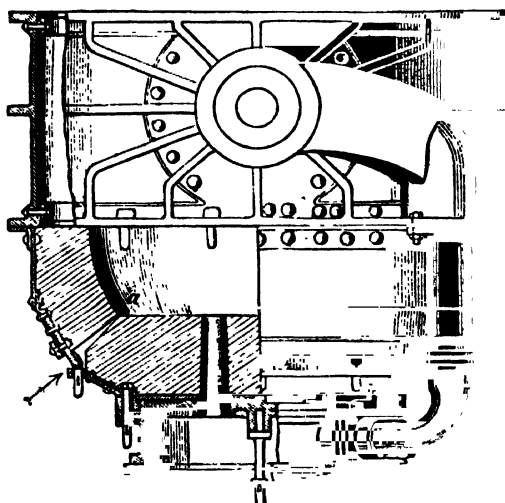
Fig. 6.



now in a cupola, furnace. In many steel works, especially in those having blast furnaces, the metal is taken direct from the blast furnace to the converter while in the liquid state, and consequently no remelting is needed. The metal is usually carried in a ladle, L, mounted on a carriage, C, as illustrated in the annexed figs. 5 and 6. When fluid it is run into a large vessel called a converter (A, in Plate), having a capacity of from 5 to 12 tons. The converting vessel is shown, enlarged in section, fig. 2, Plate II. It is made of stout boiler plate, and formerly was always lined with a powdered silicious stone found in the vicinity of Sheffield below the coal, and locally known as gannister. The converting vessel, A, is mounted on bearings, which

rest on stout iron standards, c c', and by means of gearing n, and suitable machinery for giving motion, it may be turned into any required position. An opening is made at the top for filling and pouring out the metal, and at the bottom of the vessel are inserted sometimes as many as sixteen fire-clay tuyeres, each pierced with holes, as shown in fig. 2, Plate II., and in the enlarged longitudinal and horizontal section of one of the tuyeres, fig. 4, Plate II. In the converters made up till 1870 it was necessary in repairing the bottom of the lining to knock out the tuyeres one by one, and after replacing them to make up the level of the lining at the bottom by pouring in gannister "slurry" by the converter mouth. In 1870 A. L. Holley introduced a plan of movable bottoms (see annexed fig. 7), which permits of their being rammed up anew or repaired, dried in stoves independently, and fastened on to the converter without requiring the cooling down of the converter for these operations. In replacing the bottom a joint is made at a, in cut, into which gannister is rammed from the outside. The cut also illustrates a new form of cast-iron belt, forming the middle section of the converter proposed by Holley, in order to avoid the expense of a malleable

Fig. 7



iron belt with trunnions, which was placed outside the converter body. This cast-iron portion of the converter is shown in the sketch without having the lining in position. The blast from the engine is conveyed through one of the bearings, e, of the vessel, fig. 7, Plate II., into the tuyere box, F, and enters the tuyeres at a pressure of from 10 to 18 lbs. per square inch, which is more than adequate to prevent the metal from entering therein.

Before the conversion of each charge of metal, the vessel's interior is thoroughly heated by coke, with a blast through the tuyeres to stimulate the fire; when sufficiently heated it is inverted, and all the unburned coke falls out. The vessel is then placed horizontally, and the melted pig iron run into it from the furnace by the spout, or from the ladle, L, the vessel being so held during the operation that the holes of the tuyeres are above the surface of the metal. When the proper charge of iron has been run in, the blast is turned on, and the vessel quickly moved up into the position shown in Plate II., fig. 2. The blast now rushes up from each of the tuyere holes into the fluid metal, producing a most violent agitation of the whole mass. This combines with the carbon at an intense white heat, and consumes

it in a few minutes. Good molten iron is then poured in, containing the exact quantity of carbon necessary to produce a definite quality of steel. This is one of the most important features in the Bessemer process, since it admits of all gradations, from perfect steel to iron having the slightest possible resemblance to steel. According as the metal is intended for railway axles, rails, boiler plates, ship plates, shot, guns, or other purposes, so can it be made more like steel than iron, or more like iron than steel, by adjusting the small quantity of carbonized iron thrown into the boiling contents of the converter. When the mass is thoroughly mixed, the vessel, A, is then turned into the position shown in Plate II., fig. 8, and the fluid steel run into the casting-ladle, G, which is carried by the hydraulic crane, H, being counterbalanced by the weight, I, on the opposite end of the jib, as shown in fig. 9. When all the metal is poured out of the converting vessel, the crane is raised by water pressure, and turned round, as shown in Plate II., fig. 5, for the purpose of running the steel into ingot moulds, K. Instead of tilting the casting-ladle for pouring into the moulds, it is made with a hole in the bottom fitted with a fire-clay seating, L (Plate II., fig. 6), and closed by a conical fire-clay plug, forming a conical valve. The valve-rod, N, is coated with loam, and bent over at the top, and works in guides on the outside of the ladle, as shown in Plate II., fig. 8, with a handle, O, for opening and closing the valve. By thus tapping the metal from below, no floating impurities can pass into the mould, and the current of fluid steel pours down the centre of the mould without coming in contact with its sides. The different moulds, which are of a slightly tapered form, are usually but not necessarily arranged in the pit in an arc of the circle described by the casting-ladle, as shown partly in the plan, Plate II., fig. 1.

By this process of Sir H. Bessemer we have been put into possession of a cheap material immensely superior to iron for almost every purpose to which the latter is capable of being applied. It is very much stronger in resisting both elongating and transverse strains, and is also much finer in texture, thus giving it great wearing qualities, and it can be adapted to every degree of ductility, approaching the hardness of the diamond on the one hand and the proverbial toughness of leather on the other. Man has, indeed, made few more important physical discoveries than that of a metal which is so hard that it can cut or otherwise shape every other substance on the face of the earth, and yet may be so modified in hardness that it may cut and shape itself. The cheap production of steel opened up a new era to both engineering science and to art. Where boldness and grandeur of outline are essential, as in the case of roofs and domes, &c., of enormous size, no material can rival steel, which is capable, to a far greater extent than simple iron, of being wrought into the highest artistic forms. On the other hand, if the object be simply to get tensile strength, as is the case in the chains of a suspension bridge, the use of steel wire enables us to attain a limit of strength exceeding 100 tons per square inch, or as much as five times the tensile strength of wrought iron. Engineers may now contemplate bridges of a span which would never have been possible with wrought iron, nor scarcely indeed with steel when the material would have cost £60 per ton. The extraordinary durability of the metal is shown by a fact, stated in 1880 upon the highest authority, that the economy which will have been effected in the railway system of the United Kingdom alone during the life of a set of Bessemer steel rails will, when all existing lines should have been relaid, amount to no less a sum than £172,000,000 sterling. With such an admission, it is curious to recall the fact that when Sir H. Bessemer first proposed the use of steel rails to Mr. Ramsbottom, the engineer of the London and North-western Railway, that gentleman looked upon him with astonishment, and exclaimed, almost in

anger, "Mr. Bessemer, do you wish to see me tried for manslaughter?" In 1880 it was acknowledged by the chairman of the same company that British railways could not have paid half their amount of dividend but for the use of steel rails and steel tyres. The enormous economy of coal effected by the Bessemer process is of itself alone an immense national gain. Before that method was invented it required about 6 tons of coal and the manual labour of many skilled men to make one ton of finished iron, reckoning things on an average. In the manufacture of steel the manual labour is much less, and the consumption of coal per ton of finished steel is less than 3 tons, with the prospect, under improved systems, of further diminution. The lifetime of our coal measures may thus be considerably prolonged, and the exhausting process of puddling becomes thus less necessary.

It may easily be conceived how, in all departments of manufacture, there soon sprang up a general preference for a metal the superior qualities of which were so manifest. But here a serious difficulty arose. There was one element of impurity in most of the pig iron made, namely, phosphorus, which the Bessemer process failed to expel. If phosphorus existed in the pig, it clung with desperate tenacity to the metal throughout all the process of conversion. The presence of this one vitiating element alone was sufficient to impart to steel such a degree of brittleness as to render it worthless. Now it unfortunately happened that of the 16,000,000 tons of iron ores annually raised in Great Britain only 2,500,000 tons yielded, with a carefully selected limestone for flux, a pig iron free from phosphorus, and therefore fit for steel-making. These 2,500,000 tons of hematite and spathose ores were found almost entirely in Lancashire and Cumberland, and while in these two fortunate districts the production of ore rose from 800,000 tons in 1860 to more than three times that quantity in 1879, the demand for ores from the vast deposits of Yorkshire and the various coal districts fell off to a distressing extent. Important and prosperous communities like Barrow-in-Furness arose on our north-west coast, while in great centres of iron manufacture like Cleveland industry languished, furnaces were blown out, and works were closed, until the districts presented scenes of painful distress. The Lancashire and Cumberland supplies proving insufficient, British steel makers were, while millions of tons of British ores lay idle, forced to seek for suitable hematites in foreign countries; and from Bilbao, in Spain, and other parts, large importations of ores free from phosphorus were brought into England and manufactured into steel. As the records of the Patent Office showed, many attempts were in the meantime made to purify the Cleveland and other ores, and pig iron, but without effect.

In May, 1879, however, it was announced that the problem had been solved by two young metallurgists, Messrs. S. G. Thomas and P. C. Gilchrist. The welcome news proved correct, and the severe tests applied to the invention in 1879 and 1880 showed that an apparently simple process was entitled to rank among the greatest discoveries of the age. The essence of the Thomas-Gilchrist invention is that, instead of the ordinary ganister lining of the Bessemer converter, there is substituted a basic lining which has the property of combining with the phosphorus when liberated by oxidation from the melted pig iron. The lining consists of magnesian limestone, which, after a long course of experiment, the inventors found best suited to their purpose. Basic material is also added to the charge in the converter during the blow, with the satisfactory result that from even the commonest brands of pig iron the phosphorus was effectually expelled; and not only was this arch-enemy of the steel-maker removed, but another vitiating element, sulphur, was at the same time dispersed.

As a matter of fact it is found that to work the

Thomas-Gilchrist process to the greatest advantage the pig iron must contain not less than a certain minimum quantity of phosphorus and silicon, and as a consequence of this the pig used in this process is made from a proportion of *cinder*, or rich oxide of iron slag, from puddling furnaces, mixed with the native ores. The difficulty experienced in Great Britain had been found in all steel-making countries throughout the world. France had to import the bulk of her ores for the purpose from Algeria and Elba; Belgium procured hers from Luxembourg; in fact throughout Europe, and America too, only a very small proportion of procurable ore was available for manufacture into steel previous to the Thomas-Gilchrist process, and hence it was at once received with open arms, and adopted by the most influential iron and steel manufacturers in the world.

Previous to the introduction of the Bessemer process the entire production of steel in the United Kingdom was 50,000 tons per annum, while in 1881 it was 1,200,000 tons, and in 1884 2,546,609 tons. In the whole world in 1870 the manufacture was only 392,000 tons, while in 1881 it was rather more than 3,000,000 tons. There is no saying how far this enormous development might have been increased if phosphorus and sulphur could have been eliminated so far back as 1870. In 1873 the make of Bessemer and open-hearth steel in Great Britain would not much exceed 500,000 tons. In 1882 this had risen to more than 2,100,000 tons, and how far or how rapidly this substitution of steel for iron has yet to advance it would be difficult to predict. Iron rails have been displaced by those of steel in Great Britain, and the only barrier to the exclusive use of steel for shipbuilding is one of price.

Many continental establishments are noted for the special excellence of the steel produced, particularly those of Messrs. Krupp of Essen, the Bochum Company in Westphalia, and the Bessemer works at Nœmberg, in Austria. Steel is also produced upon the Bessemer process in France, Belgium, Sweden, and Russia, though by far the largest manufacture, next to that of Great Britain is carried on in America.

The Open-hearth or Siemens Process.—The process introduced in 1867 by the late Sir William Siemens constitutes a decided advance in the manufacture of steel, inasmuch as it provides a method of producing that material which is economical in cost of plant and in its fuel requirements, regular in its operations, and more thoroughly under control than the Bessemer process. The open-hearth process is carried out in the regenerative furnace of Siemens, without which such a process could not have been economically conducted. A bath of melted pig iron is prepared, and into this are mixed quantities of iron ore or of mal-

leable iron and steel scrap, until the percentage of carbon in the mass is reduced to the proper point. The oxide of iron, of which the ore used is mainly composed, is of course reduced by the carbon of the pig iron, which escapes as carbonic oxide, flashing into numerous bright flames which escape from the surface of the bath, and thus the weight of the charge of metal is increased during the process of manufacture. The charge of steel can be kept at melting temperature for any desired time without risk, and this permits of samples being taken out from time to time in order to test the quality of the metal in the furnace, so that any desired quality may be obtained. Spiegeleisen or ferromanganese is added, and the steel is tapped into a ladle, which usually is mounted on a carriage running on rails laid either parallel to the side of the furnace or at right angles to it. The ingot moulds are placed under the level of the rails, in straight lines. This process was proposed in theory in 1845 by Heath, but the regenerative furnace is really an essential feature in its success. Before Siemens took it up it was carried out in a measure by Attwood of Wolsingham and by Martin of Hayange, in France. Siemens, however, devoted his attention to it in 1867, and carried on experimental works in Birmingham, where he perfected the process. Afterwards works were established at Landore, near Swansea, and there are now many works both in England and Scotland working this process successfully.

Trade in Iron and Steel.—It may be safely affirmed that, having regard to natural resources, no country has yet practically exhibited for this trade equal advantages to those of Great Britain. Other countries geographically may possess larger deposits both of iron ore and coal, but in none have they been found to be so concentrated in space and mutually available for utilization as in our own country. This concentration and the proximity of the deposits to the sea-board of so great a maritime country are among the chief advantages we enjoy—a fact of which the records of the trade for the last thirty or forty years may be taken as ample proof. During that time England has been looked to as the main producer of railway material and of machinery throughout the civilized world. Readily and ably she set herself to the task. Fresh capital to a very large amount was invested in the establishment of ironworks, and employment was given to an overgrowing population. The total produce of 1740 was 17,350 tons; in 1806, 250,000 tons; in 1840, 1,400,000 tons; while in 1879 the quantity, though less than in former years, was 6,000,000 tons, besides 1,250,000 tons imported, chiefly from Spain, Sweden, Belgium, and France. It takes more than half this 7,250,000 tons to supply our home necessities. The following table will be found interesting:—

EXPORTS OF IRON AND STEEL IN THE THREE YEARS ENDING 1884.

Description of Iron, &c.	Quantities.			Declared Value.		
	1882.	1883.	1884.	1882.	1883.	1884.
	Tons.	Tons.	Tons.	£	£	£
Pig iron,	1,758,072	1,564,018	1,269,677	4,962,185	4,077,456	2,945,667
Bar, angle, bolt, and rod iron, . . .	313,155	288,271	296,325	2,296,533	2,034,667	1,941,319
Railroad iron,	936,949	971,165	729,236	6,387,219	6,014,264	4,144,715
Wire,	86,658	62,620	53,230	1,339,544	926,797	693,094
Hoops, sheets, and boiler plates, . .	342,599	347,782	348,378	3,943,806	3,899,774	3,694,806
Tinplates,	265,039	269,375	288,708	4,642,125	4,705,403	4,745,702
Cast and wrought, and all other manufactures,	328,262	355,842	375,277	4,549,860	4,616,660	4,572,819
Old, for re-manufacture,	132,033	97,475	67,836	507,161	337,995	222,227
Unwrought steel,	172,329	73,131	56,614	2,034,339	1,396,556	1,125,204
Steel, or steel and iron combined, . .	18,461	13,599	11,071	942,534	580,644	402,616
Totals,	4,853,552	4,043,808	3,496,852	31,598,306	28,590,216	24,487,669

This table does not include the exports of steam-engines and machinery, which are chiefly sent to Russia, the Hanse Towns, Holland, France, India, and Australia, and which were valued at £9,948,613 in 1881—thus making a total of £37,519,415 worth of iron and steel manufactures exported from the United Kingdom in that year. In 1882, 1883, and 1884 the total quantities of iron and steel exported were 4,853,552, 4,043,308, and 3,496,352 tons, having the following values, viz. £31,598,806, £28,590,216, and £24,187,669. The exports of machinery and mill-work in these years were valued as follows:—£11,922,247, £13,433,081, and £13,051,028.

Looking at these facts it will readily be granted that this is an industry the maintenance of which is of vast interest. It is a chief source of wealth to the nation and the capitalist, but to the working population it comes home still more closely. The capital embarked in an ironworks capable of producing 1000 tons of malleable iron or of steel per week is probably about £400,000; and such an ironworks will, if kept in operation, distribute annually in wages an amount varying from three-fourths to the whole sum of its capital.

In the work of the blast furnace and rolling mills of the country, however, we have only noticed the trade in its primary action. Rightly to appreciate the position of the trade, we must point to its secondary action in the employment of labour in the various branches of manufacture which spring directly from it, such as those of ships, machinery, engines, bridge work, armour plates, anchors, tubes and pipes, galvanized iron, tinplates, nails, wire, chain cables, agricultural implements, and many others. In all these directions it is evident that it must bring a very important amount of money from foreign countries for the support of the classes engaged in manufacture, and consequently for the benefit of the community at large.

The entire value of our exports, including machinery, in 1873 amounted to £47,799,515. In 1880, as previously mentioned, the corresponding figures were only £37,653,832, showing a decrease in the six years of no less than £10,145,683. Of course, much of this falling off in value was due to the universally-prevalent commercial depression, which was the more noticeable in the United Kingdom because of the extraordinary run of prosperity enjoyed in this trade, which appeared to culminate in 1872-73. There are, however, three principal causes to which the falling off in the exports of iron may largely be traced—viz., the hostile tariffs of foreign countries; the difficulty, felt universally, of raising capital to construct railways of sufficient extent to consume the increasing produce of the works; and the high prices which prevailed, consequent on the chronic state of strike and disturbance in both the coal and iron trade in 1872 and for some time afterwards. In 1882 the entire value of the exports of iron and steel, including machinery and steam-engines, was £43,520,553, in 1883 it was £42,023,297, and in 1884 it was only £37,138,707.

Many countries, more particularly the United States, have not considered it to be their interest to follow our example as regards free trade. Their tariffs have in fact avowedly been framed with the view of excluding our manufactured iron, and of encouraging their own production; and the latter object has, especially in the case of the United States, succeeded to a great extent, the producing power there having been nearly up to the average requirement. The machinery department of the Paris Exhibition in 1878 also showed that other countries were making a very marked advance toward that perfection of iron manufactures which we had been apt to regard as peculiarly our own. It is worthy of remark, however, that notwithstanding all restrictive tariffs, British iron and steel seem likely to hold their ground, and even to make some headway, in foreign markets where the duty is not abso-

lutely prohibitive. To America, for instance, there was in 1881 a considerable increase of our exportation, notwithstanding that the duty imposed upon our iron and steel by the United States tariff is about equal to the original cost of the goods. The amount of exportation to America remained at a high figure in 1882, but in 1883 it fell enormously, and in 1884 it fell still further by nearly 50 per cent. of the previous year's amount. It remains to be seen, however, whether the decrease in our exports is due to depressed trade and commerce throughout the world, or whether an increasing export will continue in other directions after the Thomas-Gilchrist invention is thoroughly at work in foreign countries, to many of which its advantages, in rendering common ores available for steel, will be of equal if not greater value than to the United Kingdom.

IRON CROWN, THE, is the crown of the kingdom of Italy, believed to contain one of the nails of the true cross, in the form of a thin fillet of iron which runs round the inside of the broad gold jewelled band of which it consists. The relic was given by Pope Gregory the Great in 600 to Theodolinda, queen of the Longobards or Lombards. All the emperors from Henry VII. in 1311, and several before that time (notably Charles the Great, crowned with it in 800), held their Italian feudal power by coronation with this crown. Charles V. was crowned with it at Monza in 1530; and up till 1859 it was kept at the Cathedral of Monza. When in that year Lombardy was abandoned to Italy, the Austrians took the iron crown to Vienna. When peace was proclaimed after the war of 1866 between Prussia with Italy and Austria, the latter power consented to return the iron crown to Victor Emmanuel. Napoleon I. crowned himself with it as king of Italy in 1805, refusing to accept his crown from a priest's hands, though he submitted to a consecrating ceremony, and exclaiming *Dio me la diede, guai a chi la tocca*; "God has given it to me, woe to him who touches it." This motto he adopted for the Order of the Iron Crown which he founded, and which was afterwards adopted and remodelled by the Austrian emperor Francis I. in 1816. At present there are three classes, and only twenty, thirty, and fifty in each respectively. In all there are only 100 knights beyond the imperial family.

IRON GATE OF THE DANUBE, a gorge on the Danube where it intersects the mountain group connecting the Carpathians with the ranges of Servia. The defile is entered a little above Turn Severin, on the Roumanian side. The hills on the Roumanian side come first on the river; the Gate is at a point a little further up, where those on the Servian side strike on to the bank. The stream is here half a mile wide, and the Servian hills, though steep and beautiful from their rich woods, are not precipitous, and in some places leave a level strip next the water. Out of it, on the north side, bold mountains, with occasional precipices, rise to the height of 2000 to 3000 feet. The Gate itself is a ridge of rocks running obliquely across the stream, only emerging here and there from the troubled waters, but showing its presence by the waves and eddies which it raises. At one point towards the north shore the rocks have been blasted; and here, therefore, the small steamer into which passengers are usually transferred can pass in all states of the river, and the larger one, which draws 4 to 5 feet of water, when the river is moderately full. At Orsova the hills recede a little, but return again upon it further up, narrowing the channel, and forming a piece of scenery far more beautiful and striking than that of the Iron Gate. This is the defile of Kasan, some 10 or 12 miles long, where the stream, no more than a furlong wide, runs between walls of limestone rock, rising in cliffs or amphitheatres of gorgeous wood to a height of fully 3000 feet, forming certainly the finest piece of river scenery in Europe. Along the south shore can be seen the traces of Trajan's Road, carried partly on beams,

the holes for support of which still remain, and partly in a terrace cut from the solid rock. Above Kassan there are other similar reaches and defiles, with ranges of precipice, showing the most wildly contorted strata of red and white rock, till at the Castle of Columbacs the mountains suddenly recede on either hand, and the view opens on a wide plain.

IRON HAT (Ger. *eiserner hut*), a term used among some miners for the decomposed ferruginous upper portion or outcrop of a metalliferous lode. It is also called (and more fully described under) the GOSSAN.

IRON MASK, THE MAN WITH THE. The story of the state prisoner who is known by this name, and who died in the Bastille, 19th November, 1703, is one that has given rise to much curious inquiry and to considerable romance. The first published notice of this prisoner was given in a work printed at Amsterdam in 1745, entitled, "*Mémoires Secrets pour servir à l'Histoire de Perse*," but Voltaire was the first writer of note who drew public attention to the subject in his "*Age of Louis XIV.*," published in 1751. The first authentic information given to the world upon this matter was that contained in the journal of Dujunea, the lieutenant of the king at the Bastille, which was published by the Père Griffet in 1769. From an entry in the MS. journal of Dujunea, it appears that—"On Thursday, the 18th September, 1698, at three o'clock in the afternoon, M. de St. Mars, the governor, arrived at the Bastille for the first time from the islands of St. Marguerite and St. Honnat. He brought with him in his own litter an ancient prisoner formerly under his care at Pignerol, and whose name remains untold. This prisoner was always kept masked, and was at first lodged in the Basinière Tower." A letter preserved of a grand-nephew of St. Mars respecting his journey to take command of the Bastille speaks of the mask as being constantly in his presence, of the fact that no one was allowed to approach him, and that when he crossed the courtyard a black mask was always kept upon his face. The journal of Dujunea contains an entry as to the death of the unknown prisoner, who had always worn a black velvet mask, 17th November, 1703, and adds the significant note, "he had been a long time in M. de St. Mars' hands and his illness was exceedingly trifling." He was buried the day following in the cemetery of St. Paul, his name being entered in the register as Marchiali, and his age given as forty-five or thereabouts.

In the "*Mémoires Secrets pour servir à l'Histoire de Perse*" the mysterious prisoner was identified with the Comte de Vermandois, a natural son of Louis XIV. and Mademoiselle de la Vallière, a supposition followed by Père Griffet. Voltaire treated the story historically, hinting that the prisoner was a person of high rank whose identity he preferred as a Frenchman not to disclose. That he was not the Comte de Vermandois is evident from the fact that the latter died in camp in 1683, and in the numerous works issued upon the subject the mysterious prisoner has been identified with a large number of actual personages and several imaginary ones created in order to fit in with the known circumstances of the case. Among the former may be mentioned the names of François de Vendôme, duc de Beaufort, born January, 1616, died 25th June, 1669; the Duke of Monmouth, beheaded in London 15th July, 1685; Fouquet, the minister of finance to Louis XIV., who died a prisoner at Pignerol in 1680; Avedick, the Armenian patriarch, who was detained in several of the state prisons of France, and died in the Bastille in 1711; and lastly, Ereolo Mattioli, a diplomatic agent of the Duke of Mantua, who having deceived Louis XIV. after receiving his bribes was lured over the frontier and imprisoned at Pignerol in 1679. Until quite recently the latter theory, first broached in 1770, was generally accepted, but in a work published in 1873 entitled "*La*

Vérité sur le Masque de Fer," by M. Jung, it is conclusively disproved. In the despatches and reports preserved in the bureau of the ministry of war, 1700 volumes of which were examined by M. Jung for his work, records have been found which show that the prisoner, who is never referred to by name, was confined and guarded with extreme care at Exilles, St. Marguerite, Pignerol, and the Bastille, similar precautions to those already mentioned being always taken whenever he was removed. M. Jung's own theory is that the prisoner was the head of a wide-spread conspiracy for the poisoning of Louis XIV., and he identifies him with a gentleman of Lorraine who was arrested for this crime in 1673. This solution, however, has failed to gain general acceptance, and the mystery remains almost as great as before.

Among the imaginary persons, or rather persons for whom no historical existence apart from this question can be proved, who have been put forward, are that the Iron Mask was (1) an illegitimate son of Anne of Austria, born in 1626; (2) a twin brother of Louis XIV., reared in secrecy by the advice of Mazarin to prevent the evils of a disputed succession, and imprisoned by Louis XIV. for the same reason. It is certain that the court had special reasons for keeping the matter close, as the official documents which, under ordinary circumstances, would give the necessary information contain nothing, and in all necessary despatches the name of the prisoner is suppressed. It is not at all impossible, however, that the secret may lie hidden somewhere among the official documents preserved by the French officers of state, and if future investigators display the perseverance of M. Jung it may yet be revealed.

IRON, MEDICINAL PROPERTIES OF. The therapeutic use of iron has been known for a very long period, certainly more than 2000 years. Iron is an essential constituent of the blood corpuscles of all vertebrate animals, forming, as it does, a part of the red fluid hemoglobin by which they are permeated. In many forms of disease the red colouring matter of the blood becomes reduced in amount, and the condition known as *anæmia* is induced. The symptoms of this condition are a pallid countenance, the skin under the finger nails and inside the eyelids or lips being much whiter than usual, a general feeling of weakness and listlessness, shortness of breath, headache, and a disturbed state of the stomach and bowels. When women are affected the uterine functions are often irregular or in abeyance; where this is the case the complexion may assume a greenish tinge. In such conditions of the system the administration of iron is the most effective of all known remedies, and as it acts as a tonic agent directly through the blood, the beneficial effects are soon made manifest. There are many preparations of this medicine, thirty-three being included in the British Pharmacopœia, though some of these are now seldom used. Among the more important are the following:—Iron wine, made by steeping iron wire in sherry or malaga; reduced iron, a preparation of the oxide in the form of a tasteless powder of a grayish-black colour; the carbonate of iron, the active ingredient in Griffith's mixture or pills; sulphate of iron, prepared by dissolving iron wire in oil of vitriol, and crystallizing the solution; phosphate of iron, a powder of a slate-blue colour, usually given diluted with water in the form of a syrup; and the perchloride of iron, most frequently used as a tincture, and known as the tincture of steel. In diphtheria and erysipelas iron is administered in large doses, and bleeding from the lungs, kidneys, or stomach is often controlled by the tincture of steel taken in a little water. Thread worms infesting the rectum may be quickly destroyed and expelled from the system by the use of an injection made by adding half a teaspoonful of the tincture of steel to a pint of water. Almost all preparations of iron, in passing the intestines, turn the motions black, but the discolouration does not matter in

the slightest degree. Sometimes they also discolour the teeth, but this may generally be prevented by rinsing out the mouth with a little tepid water after taking the medicine. The long-continued use of iron has a tendency to produce constipation, and where it is necessary a saline purgative should be taken now and then. Occasionally, when the ordinary medical forms of iron disagree with a patient, it may be taken with advantage in the natural waters of the chalybeate springs, of which there are many in Great Britain. See CHALYBEATE SPRINGS.

IRON ORES are chiefly obtained from the carbonates, oxides, and hydrated oxides of iron. The *sulphides*—iron pyrites, marcasite, and pyrrhotine (magnetic pyrites)—are valueless for the production of iron, as the sulphur renders the metal red-short, i.e. brittle when hot; these ores are, however, of great commercial importance as sources of sulphur and sulphuric acid. The arsenical pyrites or mispickel is not used as a source of iron, the arsenic affecting the iron in the same manner as the sulphur. The phosphate vivianite, also, is a useless ore, the phosphorus rendering the metal cold-short, i.e. very brittle when cold. The titaniferous iron ores, ilmenite, menaccanite, iserine, &c., are such refractory ores that they are not generally utilized. The silicate ilvaite is a good ore, but of rare occurrence in abundant quantity.

The *carbonates of iron* are probably the most useful ores; of these, chalybite or *spathose iron ore* is the crystallized and purest form (Fe_2CO_3). It contains about 48 per cent. of iron and often much manganese, it is therefore used for the production of speiseleisen, a compound of carbon, iron, and manganese (FeMn_4C), so largely required in the production of Bessemer steel. This ore occurs in the carboniferous limestone of Durham, also in Cornwall and in the Brendon Hills, Somersetshire. *Clay ironstone* is the most important of British iron ores. It is an impure earthy carbonate, containing from 17 to 50 per cent. of iron, and occurs in thin beds or nodules in the shales of the coal measures of Yorkshire, Derby, Stafford, and South Wales. Blackband ironstone is a similar ore, but contains a large proportion of bituminous matter, so that it permits of calcination before smelting. It contains from 21 to 43 per cent. of iron. The Cleveland and Northampton iron ores occur in the oolitic limestone. Dr. Sorby has shown that the Cleveland deposit was originally a limestone, but it has now been replaced by ferrous carbonate; the mineral is therefore a pseudomorph of chalybite after calcite. The two latter contain much phosphorus.

The *oxides of iron* come next in importance as ores; of these magnetite, the magnetic or black oxide (Fe_3O_4) is the richest ore; it contains about 72 per cent. of iron, but sometimes also sulphur, phosphorus, titanic acid, or titanium. It is found mostly in the older crystalline rocks, one of the most remarkable deposits being that of Danemora in Sweden, whence most of the Swedish iron; it also occurs in Norway, Siberia, the West of England, and there are remarkable bedded deposits of both magnetite and hematite in the Laurentian rocks of Canada and in the United States. Red hematite is the ferric oxide (Fe_2O_3), and contains about 70 per cent. of iron; its crystalline forms are known as specular iron ore and micaceous iron ore or iron glance. There are several amorphous and earthy forms; all however are anhydrous, and give a red streak. This ore occurs largely in pockets in the carboniferous limestone about Whitehaven (Cumberland) and Ulverston (Lancashire). Much of it is the variety known as kidney ore, mammillated externally and with a radiated fibrous internal structure; it also occurs in Sweden, Norway, and in the United States, Canada, &c. The *Belfast or Antrim iron ores* belong to this class. They occur between the upper and lower flows of the Miocene basalts, and consist of pisolites of hematite in a matrix of alumina and ferric oxide. They contain titanic acid, which renders them refrac-

tory; otherwise they are free from injurious impurity, and being basic in character were largely employed for mixing with the silicious hematites from the Ulverston district. Brown hematite is the hydrated oxide ($2\text{Fe}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$); it contains about 60 per cent. of iron, gives a brown streak, and generally occurs in mass in an earthy form. Götthite is its crystalline variety. Other varieties are Bog-iron ore, Lake ore, &c. Bog-iron ores have been largely smelted in Canada, but generally they contain a large percentage of phosphorus. Lake ores occur in Sweden, Finland, &c. Brown hematite or limonite occurs at the Forest of Dean, Glamorganshire, Devon, Northampton, Lincoln, in France, Germany, &c. It frequently also occurs as the gossan of other metalliferous lodes. This ore is often employed for the purification of gas. Franklinite has been used as an iron ore in the United States; it consists of the oxides of iron, manganese, and zinc in variable proportions, and is found mostly associated with zinc ores in a thick bed in the Silurian limestone near Hamburg, New Jersey. Zinc is first extracted from the ore, and the residue then smelted for speiseleisen.

IRON PYRITES is a mineral of the utmost importance in the arts, for although as a source of iron it is almost valueless, owing to the deleterious effect of the sulphur, yet from it a very large proportion of the commercial sulphuric acid (oil of vitriol) is obtained. Copperas (sulphate of iron), alum (sulphate of alumina), and much of the crude sulphur (brimstone) are also obtained from it.

Iron pyrites, mundic or pyrite (Gr. *pur*, fire), is a bisulphide of iron (FeS_2), having a hardness of 6 and specific gravity of 5. It crystallizes in the octahedral system, most usually in cubes with striated faces. The striae on alternate faces, are at right angles, showing the cube to be but the limiting-form of the pentagonal dodecahedron.



Aggregation of Crystals of Iron Pyrites.



Octahedron of Iron Pyrites, showing faces of the crystal with small secondary crystals attached.

the striae being produced by the oscillation of the faces. It occurs also massive, in finely disseminated crystals or particles, and sometimes in nodules with a radiated fibrous structure. It is generally brass yellow in colour, and has a splendid metallic lustre, is brittle, and gives a brown black streak.

Pyrites occur in many crystalline and metamorphic rocks, also in well-developed crystals, in fine slate, shales, &c. It is a stable mineral, except when it contains some of the dimorphic form marcasite, which crystallizes in the rhombic system. When this is present it decomposes rapidly on exposure to the air and moisture, staining the rock brownish-yellow. It is of constant occurrence in mineral veins associated with other ores, and is the substance from which the gossan mostly results. It frequently contains a small percentage of copper (cupriferous pyrites) or minute quantities of the precious metals (auriferous pyrites), and is frequently the source of much of the stream gold.

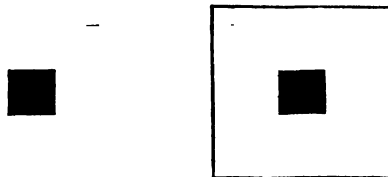
Most of the pyrites used in the British Isles was some

time ago obtained from the Wicklow mines, Ireland, now it almost altogether comes from the Huelva district in Spain, where huge lenticular masses of pyrites and marcasite occur conformably with the clay slate and associated with intrusive masses of diorite; it is considered as possible—and some of the accompanying phenomena favour the idea—that they themselves may be intrusive. These pyrites are cupriferous and contain traces of the precious metals. After the extraction of the sulphur, the residue (cinder) is treated by a wet process and lixiviated for the contained copper and other valuable metals.

IRONSIDES, THE, perhaps the most famous regiment of the world, were the cavalry soldiers raised and commanded by Cromwell himself. Early in the war Cromwell saw that a mere rout of discontented serving-men and mercenaries were no match for the brilliant chivalry whom the king led. He therefore, in his practical way, set to work to get together a troop of "God-fearing men;" and early in 1643 he was able, by constantly weeding out the inferior men and substituting better, to get such a thousand troopers as there was not the like of in that age. No plundering, drinking, disorder, or impiety was allowed. They had the fear of God—other fear had they none. "Not a man swears of Colonel Cromwell's soldiers but he pays his twelve pence," says a newspaper of the time, the *Elenchus Motuum*. Cromwell was able to write of his regiment in the Eastern Association as early as September, 1643, "God hath given it to our handful; let us endeavour to keep it. I had rather have a plain russet-coated captain that knows what he fights for, and loves what he knows, than that which you call a gentleman and is nothing else. I honour a gentleman that is so indeed." And again, 11th September, 1643, speaking of his having spent already £1100 or £1200 of his own, he adds, "I desire not to seek myself, but I have little money of my own to help my soldiers; I have a lovely company; you would respect them did you know them. They are no anabaptists, they are honest sober Christians—they expect to be used as men!" They were the first *red-coated* soldiers, choosing the colour to clearly distinguish them in battle, for confusion had arisen through each yeoman-soldier wearing his ordinary russet. The red coats began in the summer of 1643. There is a characteristic letter of Cromwell to another regiment, ordered by the Eastern Association to follow the pattern of the Ironsides. "To Mr. Russell, at his Quarters, Burnley by Bow, 1643. Sir, I learn your troops refuse the new coats. Say this: wear them, or go home. I stand no nonsense from any one. It is a needful thing we be all as one in colour, much ill having been from diversity of clothes—to slaying. Sir, I pray you heed this.—Oliver Cromwell." This regiment soon earned its nickname of the Ironsides. It was perpetually in action, and never sustained a defeat. At Winceby (where Cromwell was nearer death than ever after) the Ironsides charged singing psalms, with their colonel in the van; they cleared all Lincolnshire by themselves of the Cavendishes, and they required but little help so thoroughly to clear the eastern counties that the king had never after any hold there. They routed the best cavalry in the regular army at Marston Moor, under Rupert himself, the king's nephew; and had not Manchester, against Cromwell's urgent prayers, stayed them, they would have probably terminated the war at Newbury's second battle by capturing the flying king, almost in their hands. As their commander said with honest pride, when he was monarch of all England (speech to second Parliament, 18th April, 1657), "I raised such men as had the fear of God before them, as made some conscience of what they did; and from that day forward I must say to you, *they were never beaten*, and wherever they were engaged against the enemy they beat continually." See Carlyle's "*Cromwell, passim*."

IRONY (Gr. *cirōneia*), a refined species of ridicule which, under the guise of earnestness and simplicity, exposes all undue pretensions, even while it professes to honour and admit them. Socrates was a great master of irony; in fact, it has been happily said he raised it to the dignity of a philosophical method. The Greek *cirōn* was a dissembler who said less than he thought, who held back the full expression of his sentiments. The modern term is not therefore coincident with the Greek, but is rather an amplification of it. The Greek irony was an affectation of ignorance by a superior person. Modern irony also includes the further assumption of a false character in order to reduce the opponent's position to ridicule. Defoe's "Shortest Way with Dissenters" (to banish the hearers and hang the preachers) is possibly the most successful piece of irony extant. He deceived both sides. The Tories wrote to congratulate him, the Whigs denounced him as a recreant. On his confessing the irony the enraged Tories put him in the pillory. But in general, among English authors, the writings of Swift contain the most numerous and most happily expressed examples of irony.

IRRADIATION is that dazzling effect of brilliant light upon the eye by which a bright object looks larger than its real size. Thus, when we see the "old moon in the new moon's arms," the dark part of the moon being faintly lit by earthshine reflected from the earth, then we clearly see that the bright crescent belongs to a larger



sphere than the dark spheroid. The difference is marked. It can be shown also by the increased size of a white square on a black ground over a black square (on a white ground) of the same size. This effect has great results in apparently magnifying the size of the stars. It varies very much in different persons.

IRRAWADY. See IRRAWADDI.

IRRIGATION. Of all the substances which concur in the vegetation and growth of plants water is the most essential. The warmer the climate and the more rapid the evaporation, the more luxuriant is the vegetation, provided there be an abundant supply of water. This circumstance has suggested the plan of diverting streams from their original courses, and conducting them in channels to fertilize as great an extent of land as possible. In China and in India, as well as in Egypt, ingenious methods of watering lands have been adopted from the most remote ages. No expense has been thought too great to secure a supply of water, and to distribute it in the most advantageous manner.

The whole art of irrigation may be deduced from two simple rules: first, to give a sufficient supply of water during all the time the plants are growing; and secondly, never to allow it to accumulate so long as to stagnate. The supply of water must come from natural lakes and rivers, or from artificial wells and ponds, in which it is collected in sufficient quantity to disperse it over a certain surface. As the water must flow over the land, or in channels through it, the supply must be above the level of the land to be irrigated. But there must also be a ready exit for the water, and therefore the land must not be so low as the natural level of the common receptacle of the waters, whether it be a lake or the sea to which they run. Along the banks of running streams nature points out the

declivity. A channel which receives the water at a point higher than that to which the river flows may be dug with a much smaller declivity than that of the bed of the river, and made to carry the water much higher than the natural banks. It may thence be distributed so as to descend slowly, and water a considerable extent of ground in its way to rejoin the stream. This is by far the most common mode of irrigation, and the shape, size, and direction of the channels are regulated by the nature of the surface and other circumstances, which vary in almost every situation. When there is a considerable fall and a sufficient supply of water, a series of channels may be made, so situated below each other that the second collects the water which the first has supplied, and in its turn becomes a feeder to irrigate the lower parts of the declivity; a third channel receives the water and distributes it lower down, until the last pours it into the river. This is called catch-work, because the water is caught from one channel to another. It is by far the cheapest plan of irrigation, and as it can be applied to a hillside as well as to a level field, its adoption is rapidly extending. A small rill, which is often quite dry in summer, may still by judicious management be made to improve a considerable portion of land; its waters may be collected and allowed to accumulate in a pond or reservoir, and let out occasionally, so that none be lost or run to waste. If there is but a small quantity it must be husbanded and made to flow over as great a surface as possible. If there is not a want of water, there may be a want of declivity to enable it to flow off, which, it should always be remembered, is an essential part of irrigation. Art may in this case assist nature by forming a passage for the water, either in its course towards the land to be irrigated, or from it after it has effected its purpose.

When the surface to be irrigated is very flat and nearly level, it is necessary to form artificial slopes for the water to run over. The whole of the ground is laid in broad beds, undulating like the waves of the sea; and the water, carried along the ridge of each bed, is allowed to flow down the slopes.

Experience has shown that there are particular seasons when the water has the best effect. During frost the water-meadows, having a current of water continually flowing over them, are protected from the effect of frost, and the grass will continue to grow as long as the water flows over it. Too much moisture, however, would be injurious, and the meadows are therefore laid dry by shutting the flood-gates whenever the temperature of the air is above freezing. By this management the grass grows rapidly at the first sign of spring. Before the dry upland meadows have recovered the effects of frost and begun to vegetate, the herbage of the water-meadows is already luxuriant; and by judicious management three or four crops of grass are obtained in each season, or only one abundant crop is made into hay, and the sheep and cattle feed off the others.

In hot weather much mischief may be done by injudicious flooding. In winter, on the contrary, the land may be covered with water for weeks without injury; and if an early deposit takes place, the subsequent fertility is greatly increased. But this is not properly irrigation; it is inundation, and the effects depend entirely on different causes. On the other hand, water may be carried in small channels through meadows without being allowed to overflow; this is watering, but not properly irrigating. The great advantage of water-meadows in England is not so much the increased quantity of grass or hay which is obtained when they are mown, as the early feed in spring, when all kinds of nutritive fodder are scarce.

When it is intended to form a water-meadow on a surface which is nearly level, the whole of the land must be laid in beds about 20 or 30 feet wide; the middle or crown of

these beds being on a level with the main feeders, and the bottoms or drains on a level with the lower exit of the water, or a little above it. Grass seed being sown over these beds the water may be let on for a very short time, to make them spring. As soon as the grass is 2 or 3 inches above ground a regular flooding may be given, and in a very short time the sward will be complete. Instead of sowing seed, tufts of grass cut from old sward may be spread over the newly formed beds, and they will soon cover the ground.

It seems essential to the formation of a good water-meadow that the bottom be porous and free from stagnant water; hence under-draining is often indispensable before a water-meadow can be established; and a peat bog, if drained and consolidated, may have water carried over its surface, and produce very good herbage. If the soil is a very stiff clay, draining is almost indispensable where a water-meadow is to be made.

The usual time of letting on the water on water-meadows is just before Christmas, and it may continue to flow over the land as long as the frost lasts; in mild weather it may be turned off during the day and put on again at night until the frost is gone. The grass will soon begin to grow, and be ready to be fed off. When this is done, the water is immediately let on for a short time, and turned off again to allow the ground to dry after a few days' flooding, and the water is let on again at short intervals. The warmer the air is, the shorter time must the water be allowed to cover the meadows. By means of judicious irrigation good grass crops may be obtained year after year without any manure being put on the land.

Irrigation is not practised to such an extent in Great Britain as seems desirable. The whole of the water-meadows do not probably exceed 100,000 acres, and are chiefly confined to the south and west of England. On the Continent the great plains and valleys of the Po, Adige, Tagus, Douro, and other rivers are systematically irrigated, and their fertility wonderfully increased in consequence. The system is also very extensively pursued in India, and is being extended in every direction in that country.

The distribution of liquid manure over the land answers the same purpose as irrigation; and from the satisfactory results which have attended this plan of increasing the fertility of the soil, there can be no doubt that it will be more and more resorted to. An extensive tract of land lying between Portobello and Leith, known as the Craighent-meadows, has for some time been covered with the sewage of Edinburgh, and now yields a rent of at least £20 an acre. Grass is cut on it from three to five times a year, and as much as 10 tons an acre have been obtained at a cutting. The advantages of this application of liquid manure will be further shown under SEWAGE UTILIZATION OF.

IRRITABILITY is the special property of the living muscle and nerve. See MUSCLE, NERVE.

IRVINE (formerly written *Irign* and *Irvine*), a seaport of Scotland, in the county of Ayr, is situated on the north bank of the river Irvine, a little below its confluence with the Garnock, 77 miles W.S.W. of Edinburgh, and 400 miles from London by the Glasgow and South-Western Railway. Formerly the sea came up close to the town, and vessels were loaded and discharged at the Seagate, as it is still called; but the town is now nearly half a mile distant from the harbour, which has a good quay, and admits vessels of 100 tons. Irvine is one of the most ancient of the royal burghs of Scotland, and is also a parliamentary burgh, included in the Ayr district. The principal buildings are the academy, the town-house, two banks, parish church, two Free churches, two United Presbyterian churches, an Established church, a Baptist chapel, and a Roman Catholic chapel. A statue of Lord Justice-general Boyle was erected in 1867. Four chemical works, iron foundries, anchor works, rope-walks, distilleries

and tanneries afford employment. The imports consist chiefly of timber, grain from America, and large quantities of grain and butter from Ireland. The exports are chiefly coals and young trees. John Gault, author of "Annals of the Parish" and other works, and James Montgomery, the poet, were natives of the town; and Burns was for a short time engaged in business in it as a flax-dresser. The population of the parliamentary burgh in 1881 was 8503.

IRVING, REV. EDWARD, a famous pulpit orator and one of the founders of a religious sect, was born at Annan in Dumfriesshire, 4th August, 1792. He studied at the University of Edinburgh, and there acquired such marked distinction in the exact sciences, that before reaching his seventeenth year he was recommended by Professor Leslie for the situation of teacher of mathematics in the burgh school of Haddington, where he became the tutor of Jane Welsh, afterwards the wife of Thomas Carlyle. In the following year he was appointed to a similar office in Kirkcaldy, where he remained nearly seven years, at the same time laboriously studying theology and attending at intervals the divinity hall at Edinburgh, with the view of entering the church. In 1819 he was licensed as a preacher in connection with the Established Church of Scotland by the presbytery of Annan; and happening to preach in St. George's Church, Edinburgh, Dr. Chalmers, who was one of his hearers, was so favourably impressed with his discourse that he appointed him his assistant in the parish of St. John's, Glasgow. After spending three years in Glasgow, perhaps the happiest and most useful period of his life, he was invited to become the pastor of a Presbyterian chapel in Cross Street, Hutton Garden, London, attached to the Caledonian Asylum. He accordingly settled in London in August, 1822. The chapel was at that time nearly empty, and was besides situated in an obscure and unfavourable locality; but in the course of a few weeks Irving's remarkable style of oratory caused an extraordinary sensation in the metropolis, and the mean-looking, dingy sanctuary in Hutton Garden was thronged, Sunday after Sunday, with statesmen, philosophers, poets, painters, literary men, merchants, peers, fashionable ladies, mingled with shopkeepers and mechanics, while many hundreds were unable to obtain admission. About a year after his settlement in London he published a volume of discourses, under the title of—"For the Oracles of God, Four Orations; For Judgments to Come, an Argument, in nine parts," three editions of which were called for in little more than six months. Irving's popularity continued with no abatement for about two years, and a new church was erected for him in Regent Square, capable of accommodating 2000 persons. After a time, however, the fashionable world grew tired of him, and he found his hope of becoming the leader of a great religious revival among the leaders of society incapable of realization. It was under the influence of this sense of failure that he began to devote himself with characteristic ardour to the exposition of unfulfilled prophecy, and in a bulky volume, entitled "Babylon and Infidelity foredoomed by God," 1826, he ventured to predict the exact date of the final overthrow of popery and infidelity, and confidently fixed upon 1868 as the period when the millennial reign of Christ was to commence on earth. He next adopted the opinion that it was want of faith alone which prevented the miraculous gifts conferred upon the primitive church from being enjoyed by the church in modern times; and having for some time earnestly prayed for and eagerly expected the return of these gifts, he soon became infected with the religious frenzy which at this period broke out at Row on the Frith of Clyde, and declared his firm belief in the truth of the claims which some of his fanatical followers made to the power of working miracles and speaking in unknown tongues. He also began to disseminate, both from the pulpit and the press, notions respecting the alleged peccability of our Lord's human nature, which in the

judgment of the presbytery of London, before which he was arraigned in 1830, were decidedly heretical, and in consequence of which he was ejected from his new church in Regent Square in 1832, and in 1833 deposed from the ministry by the presbytery of Annan, which had licensed him. A new chapel was built for him by his followers in Newman Street, and a new form of Christianity was gradually developed, but his health began to give way under his incessant labour and excitement; he repaired to Scotland for change and repose, but died in Glasgow, 8th December, 1834, in the forty-third year of his age. With all his frailties Edward Irving was a man of devout and earnest spirit, honest, simple-hearted, and of undaunted fearlessness. Thomas Carlyle, who was an intimate and life-long friend, writes concerning him—"But for Irving I had not known what the communion of man with man means. His was the freest, brotherliest, bravest human soul mine ever came in contact with: I call him, on the whole, the best man I have ever, after trial enough, found in this world, or now hope to find." In addition to the works already mentioned, he published a missionary "Oration" in 1821; an Introductory Essay to Bishop Horne's "Commentary on the Psalms" in 1824; and "Sermons, Lectures, and Occasional Discourses," in three vols., in 1828. An admirable life of this extraordinary man was written by Mrs. Oliphant, the well-known novelist; and "Selections from the Sermons and Writings of the Rev. Edward Irving" has been published by his nephew, the Rev. G. Carlyle, who has also published a collected edition of his works in five volumes. See also Carlyle's "Reminiscences," vol. i., and the same author's article on Edward Irving published in his "Miscellanies."

IRVING, WASHINGTON, one of the most pleasing and popular of American writers, was born at New York on the 3rd of April, 1783. He was of Scottish origin, his father belonging to a family of Irvings long settled in the Orkney Islands. The earliest contributions Washington made to literature were light sketches of men and manners, published in 1802 in the *New York Morning Chronicle*. In 1803 he travelled extensively in Southern Europe, paid a visit to England, returning home in 1806, and contributed a series of humorous essays to a periodical called *Salmagundi*. In 1809 Irving published his first book, the "History of New York, by Diedrich Knickerbocker," a burlesque chronicle written in a vein of such quiet humour that it has sometimes been taken for a veritable history. About this time Irving was admitted a partner in the thriving commercial house which his brothers had inherited from their father. He also edited the *Analectic Magazine*. In 1816 he visited England, and was introduced to Sir Walter Scott. In the same year disaster overtook the firm to which he belonged, and he turned to literature, not as a pastime, but as a resource. Two eminent publishers refused the "Sketch Book," part of which had appeared in New York; but Scott came to the rescue, and advised Murray to publish it. Its success was immediate and immense. For his next work, "Bracebridge Hall," the publisher offered 1000 guineas without seeing the MS. "Tales of a Traveller" followed in 1821. During a residence in Madrid Irving wrote the "Life and Voyages of Columbus" (which was published in 1828, and remains a standard work on the subject), "The Voyages of the Companions of Columbus," "The Conquest of Granada," "The Alhambra," "Legends of the Conquest of Spain," and "Mahomet and his Successors;" which were published at intervals up to the year 1849. In 1829 he was appointed secretary to the American Legation in London. In 1831 the University of Oxford conferred on him the degree of LL.D.; and of the two gold medals placed by George IV. at the disposal of the Royal Society of Literature, Irving received one and Mr. Hallam the other. Resigning his diplomatic functions in 1831, he returned to America a

distinguished and respected man. A visit to the Rocky Mountains produced his "Tour on the Prairies," afterwards republished, with his "Recollections of Abbotford and Newstead," in the *Crayon Miscellany* of 1835. In "Astoria," 1836, he sketched the history of the remarkable enterprise which his friend John Jacob Astor had set on foot many years before, to carry the fur trade across the Rocky Mountains. The "Adventures of Captain Bonneville" came from his pen in 1837, and numerous stories and essays in the *Knickerbocker Magazine*, afterwards collected under the title of "Wolfert's Roost." To 1841 belongs his "Life and Poetical Remains of Margaret Davidson." In 1842 he was appointed minister to Spain. Returning to America in 1845, he lived on his estate, called Sunnyside, on the banks of the Hudson, 25 miles from New York, where he dispensed a liberal hospitality. In 1849 he published his "Life of Goldsmith," and in 1859 completed his last work, "The Life of Washington." He died at Sunnyside, in his seventy-eighth year, on the 28th November, 1859, having enriched the literature of his country with many excellent works, and bequeathing to the biography of authorship a life singularly pure, honourable, and happy. His life has been published by his nephew, Pierce Irving. The finest edition of his works is that known as the Geoffrey Crayon edition, published in twenty-six volumes at New York in 1880.

IRVINGITES, the name commonly given to a small sect of Christians of modern origin, who, rejecting absolutely this designation, speak of themselves as the Catholic and Apostolic Church. The society arose in 1829-30 in connection with the ministry of the Rev. Edward Irving, and was associated with certain manifestations which his followers claimed to be inspired by the Holy Ghost. They took the form at first of speaking in unknown tongues—i.e. unintelligible language, and in the utterance of prophecies. Gradually a new system of church government was evolved, and the final result was the establishment of a regular church. Its most peculiar tenet is that the apostolic order has been revived, and that the other orders in the church should be that of (1) prophet, (2) evangelist, (3) pastor. The congregations are placed under the charge of angels or bishops, the other orders mentioned, deacons, and elders, the ministry being supported by free-will offerings and a tithe of the income of all the members. In doctrine the Catholic Apostolic Church accepts the Apostles', Nicene, and Athanasian creeds, and also most of the ideas common to Christianity. Its members maintain, however, that the mystery, miracle, and inspiration of apostolic times are given also in the present to prepare believers for Christ's second coming. In its worship it uses a very elaborate symbolism, and the Eucharist, concerning which a peculiar doctrine is held, is celebrated every Sunday and frequently during the week. The doctrines of transubstantiation and consubstantiation are rejected, but the brethren believe in the objective presence of Christ in the sacred elements, and keep a portion on the altar at the time of ordinary worship. The Catholic Apostolic Church has been favoured with wealthy and influential patronage from the first, and it has established itself in Scotland, Ireland, the colonies, the Continent, and America, but the congregations are small and the body has long since ceased to attract much public attention.

ISAAK I., COMNENOS (*Komménos*), the first Byzantine emperor of that family. (The Comnenoi came in with an Isaac and went out with an Isaac.) He rose to great favour with the people, and occupied many state posts. Finally he was proclaimed by the army in Asia, 1057, and deposed Michael VI., 81st August, 1057. He ruled excellently, and the empire, in the utmost disorder at his accession, soon revived. He had a hard struggle with the Hungarians, whom he drove off in 1059. After that, being seized with severe illness, he resigned the crown in favour of his general,

Constantine Dukas. He retired to a monastery and died in 1061.

ISAAC II., ANGELOS COMNENOS, emperor (1185-1204), opposed the passage of the crusaders under Frederick Barbarossa, emperor of Germany, 1189, but eventually furnished a fleet for their crossing into Asia. He was dethroned and blinded by Alexios, his brother, 1195. He was restored by the crusaders and crowned jointly with his son on condition of ratifying a treaty his son had entered into with them, 18th July, 1203. He was miserably put to death after the departure of the crusaders by his chamberlain, Alexios Dukas, 25th January, 1204, and the traitor succeeded to the throne.

ISAAC HEINRICH, the first great German musical composer, was born at Prague about 1520, and died about 1520. He was at one time the favourite composer to Lorenzo de' Medici, and teacher of his children. A MS. of Isaac's of 1488 is extant, where his music accompanies a dramatic poem of Lorenzo himself. Later he was in the service of the Emperor Maximilian I. Much of Isaac's mass-music has been reprinted. It is of great merit. But what makes him specially remarkable is his composition of many of the most famous hymn tunes, such as "O weilt, ich muss dich lassen," a great favourite with Bach, &c.

ISABELLA OF CASTILE, surnamed *the Catholic*, daughter of John II. of Castile, was born 22nd April, 1451. In 1469 she married her cousin Ferdinand, son of John II. of Aragon, and in 1474, on the death of her brother Henry, she was proclaimed Queen of Castile and Leon. In 1479 Ferdinand inherited the crown of Aragon by the death of his father, and thus the two most powerful monarchies of the peninsula were incorporated. The public events of the united reign will be found recorded under FERDINAND V. Strictly pious from girlhood Isabella raised greatly the moral tone of the Spanish court, and aided by Cardinal Ximenez imposed stricter discipline among the clergy. She encouraged the trade of the country, sought to mitigate the severities of taxation, and shared herself in the trials and dangers of the campaign against the Moors. It was Isabella who first entertained the lofty schemes of Columbus, and it was at her expense that his first expedition was fitted out. The strength of her religious convictions, however, placed her greatly under the influence of the more narrow-minded and intolerant of the Spanish clergy, and the cruel expulsion of the Jews and the introduction of the Inquisition wrought mischief to Spain so extensive in its effects that the injury has never since been repaired. She died at Medina del Campo, 24th November, 1504, bequeathing her crown, which she had always kept jealously independent of her husband, to her daughter Juana, and her jewels with a handsome robe to Ferdinand, whom she found by an oath never to marry again. See Prescott's "History of the Reigns of Ferdinand and Isabella."

ISABELLA THE CATHOLIC ORDER OF, a Spanish order of knighthood founded by Louis VII. in 1155, as a reward for the defence of the possessions of Spanish America. The sovereign is the head of the order, and it has three classes—grand crosses, commanders, and knights. It is now conferred for all kinds of services.

IS'ABEY, a modern French painter of distinction, was born at Nancy, 11th April, 1767, and studied under the famous David, 1790. He was appointed miniature painter to Napoleon I. in 1805, and accompanied the empress to Vienna on the overthrow of the French Empire in 1811. He died there in 1850.

ISAI'AH (Heb. *Yeshayáhu*, Salvation of Jehovah), one of the greatest of the Hebrew prophets, was the son of an unknown Amos or Amotz, but the date of his birth is unrecorded. He was called to the prophetic office either four years before the death of Uzziah, 762 B.C., or in the last year of Uzziah, 759, and his ministry continued

through the reigns of Jotham, Ahaz, and Hezekiah, or at all events until the seventeenth year of the reign of the latter king. It is probable that Isaiah lived much longer, for the statement (2 Chron. xxxii. 32) that "the rest of the acts of Hezekiah were written in the vision of Isaiah," seems to imply that he survived that monarch, and there is an ancient tradition among the Jews to the effect that he was put to death by being sawn asunder during the reign of Manasseh. The lowest calculation gives him a ministry of forty-nine years; the highest sixty-four years. From his writings we learn that he was a native of the kingdom of Judah; that he resided at Jerusalem; that he was married and had two sons; and that he held a very high and dignified position in the nation. The period at which he lived was one of supreme crisis in the history of Israel, and his influence upon both the political and religious life of the nation was of immense importance. The first part of his ministry relates to the time previous to the war of Syria and Ephraim, when the land of Judah, though enjoying external peace, was yet morally corrupt and full of tyranny and oppression. This was followed by a time of war and invasion, when under the reign of Ahaz the country was invaded by the united forces of Syria and the northern kingdom of Ephraim, and the Judean monarch became a vassal of Tiglath-pileser, king of Assyria, in order to obtain his help against them. The closing period of the public life of the prophet extends through the time of Assyrian suzerainty, when Judah, feeling the weight of the yoke, began to intrigue with Egypt, and was invaded by the Assyrian armies. Isaiah foretold the wonderful deliverance caused by the mysterious destruction of the Assyrian army in the year 701, gave Hezekiah an assurance of prolonged life at a time of severe sickness, and later warned the king of the danger he had incurred in displaying his treasures to the ambassadors of Merodach-baladan of Babylon. This is the latest event recorded in his life.

Regarded in the order of time the writings of Isaiah would form the fifth of the prophetic books, for Joel, Jonah, Hosea, and Amos were his predecessors. According to a tradition preserved in the Talmud, the prophecies of Isaiah were formerly placed after Jeremiah and Ezekiel, and this order is preserved in the French and German MSS. In the "Masona," the oldest Hebrew MS., and all the ancient versions Isaiah is placed the first of the prophets. The book of Isaiah is larger than any other prophetic book, and it exceeds in bulk the writings of all the twelve minor prophets taken together.

The peculiar sublimity, beauty, and extent of the prophecies of this book have directed the attention both of Jews and Christians more strongly to it than to any other in the prophetic canon of the Old Testament, and perhaps no other book has received so much study as this from the critics and scholars of modern times. There is a palpable division of the book into two portions, the first extending from the commencement to the end of chapter xxxix., and the second beginning with chapter xl. 1, and extending to the end of the book. With respect to the first of these divisions it is generally admitted that the various oracles it contains are not arranged in chronological order, but the greater portion of this is universally ascribed to the prophet. Many scholars regard it as being the composition of the prophet himself, or that it was drawn up under his immediate direction, while others profess to find in it traces of more than one editing and the interpolation of several earlier and later oracles. It is around the second portion of the book, however, that the strongest controversy has arisen, and the authorship of the last twenty-seven chapters forms one of the most keenly contested points of criticism that has yet arisen in connection with the Old Testament. The earlier traditions of both Jews and Christians are unanimous in ascribing this portion of the book to Isaiah, and the first person who appears to have questioned its genu-

ineness was ABEN EZRA, a celebrated Jewish scholar of the twelfth century. The suggestion of Aben Ezra was revived in 1797 by Koppe, who, in a translation of the notes of Bishop Lowth into German, propounded the theory that it was the work of another hand. In this theory he has been followed by Eichhorn, Bauer, Paulus, Gesenius, De Wette, Davidson, Ewald, Bleek, and Cheyne among many others, who ascribe this portion of the book to some "great unknown" prophet who lived about a century after Isaiah in the period of the exile. The chief arguments against the Isaiah authorship are derived from the facts—(1) that the whole of the prophecies have a plain connection with that period of the Chaldean captivity which must be placed at least a century after the death of the prophet; (2) that the exile and desolation of the kingdom are referred to as having already taken place; (3) that a close acquaintance is displayed with the condition of the exiles during the period of their captivity; (4) that there is a marked difference both in style and sentiment, the second portion of the book containing more lofty and spiritual conceptions of religious truth, and being written in a more flowing and majestic manner. Other objections are found in the references to Cyrus and his career, and in the linguistic character of these chapters, which is said to show a later period than that of Isaiah. On the other hand a large number of eminent critics maintain the genuineness of this second portion as part of the original prophecy of Isaiah, among whom may be mentioned Jahn, Moller, Drechsler, Meier, Hengstenberg, Havernick, Keil, Alexander, Birks, and Uwick. This view is also sustained in Smith's "Biblical Dictionary" and the celebrated "Speaker's Commentary." By the conservative critics this portion of the book is attributed to the old age of the prophet, and its predictive character is strongly insisted on.

The Messianic prophecies of this book have ever been applied by Christians to Jesus Christ, and they are regarded alike as divine proofs of his supernatural nature and mission, and as pointing out the glories of his kingdom on the earth. The critics of the modern school who reject this view of prophecy are somewhat at a loss for an explanation of these utterances. In the "servant of Jehovah" referred to by the prophet, Rosenmüller and Hitzig find a reference to the people of Israel in their attitude towards the heathen during their captivity; Hendewerk, Paulus, and Morer find in it a reference to the pious and youthful portion of the nation as opposed to the incorrigible old; Hoffman interprets it as meaning Israel the prophetic people suffering for the Gentiles; while Gesenius, De Wette, and Umbreit apply it to the prophetic class or order.

The literature that has gathered round this book is of a very extensive character. The names of most of the more important writers have already been mentioned, but additional matter may be found in Dean Stanley's "History of the Jewish Church" and Sir Edward Strachey's "Jewish History and Politics in the Time of Sargon and Sennacherib" (second edition, London, 1874).

ISATIN, a substance obtained from indigo by oxidation with nitric acid. It crystallizes in brilliant red prisms, having a bitter taste; it melts when heated, and can be sublimed unchanged. It is slightly soluble in cold water, very soluble in boiling water, also in alcohol, and sparingly in ether. It is soluble in hot nitric acid without decomposition, but if boiled it is decomposed into oxalic acid. The formula is $C_8H_5NO_2$. It has given rise to a large series of derivatives, of which the following are the best known:—Chlorisatin ($C_8H_4ClNO_2$) and dichlorisatin ($C_8H_3Cl_2NO_2$), obtained by the action of chlorine on isatin or on indigo; bromisatin ($C_8H_3BrNO_2$) and dibromisatin ($C_8H_2Br_2NO_2$), the corresponding bromine compounds. These are all crystalline bodies resembling isatin. Isatin also combines with sulphuric and sulphurous acids, forming a number of salts called isatosulphates and isatosulphites.

ISATYDE is obtained from isatin by the action of a reducing agent, and is related to isatin as indigo white is related to indigo blue. It is a white crystalline substance, insoluble in water, and only slightly soluble in alcohol and ether. The formula is $C_{16}H_{12}N_2O_4$; it contains two atoms less of hydrogen than isatin. It also yields several chlorisatydes, bromisatydes, and sulphisatydes.

ISCHIA, the ancient *Ænaria*, an island situated at the northern entrance of the Bay of Naples, the smaller island of Procida lying between it and the promontory of Misenum on the mainland. It is mountainous, and abounds in most enchanting scenery. The highest summit, called Epomeo, which is an extinct volcano, rises about 2800 feet above the sea. Strabo calls this island Pithékusai, from *pithêkos*, an earthen vessel, the clay of the island being used for earthenware from the remotest time. The soil is very fertile and produces corn, abundance of superior wine, and all sorts of fruit. The hills are covered with chestnut trees. Sulphur is abundant, and there are mineral springs at Casamicciola. The island is about 20 miles in circuit. Ischia is divided into two cantons, and contains the small towns of Ischia and Casamicciola. In 1883 a sudden earthquake shock laid the latter town in ruins, and buried nearly 4000 of the inhabitants and visitors. The shock continued only fifteen seconds, but was most destructive. It occurred at half-past nine in the evening, in beautiful, calm, cloudless weather, when several hundreds of people were in a temporary theatre, built of wood. Many of these escaped the fate which befell almost every one of those who were in the stone-built houses of the town. The alarm and confusion in the theatre cannot be imagined, as the ground lifted and tossed beneath them, with a dreadful rumbling noise, and the air was filled with dust; the canvas roof fell in, throwing down the lights of the theatre, which set it on fire. In the block of houses, entirely occupied by visitors, between the Via dei Bagui and the Piccola Sentinella, not one was saved; all the buildings fell at once upon their inmates.

IS'DUBAR (the Babylonian Nimrod) is the phonetic value of an ideogram found on certain Assyrian clay tablets of cuneiform writing in the British Museum, as the name of the hero, an ancient king of Erech [see BABYLONIA], whose exploits they celebrate. The tablets were discovered by Dr. George Smith of the British Museum, and contain fragments of an epic poem in twelve long cantos of about 3000 lines. Isdubar is of course not the name of the king; it is the name which the same signs would give if they stood for ordinary letters; still until the true meaning of the ideogram is discovered it serves to distinguish the hero. Several later additions have been made to Mr. Smith's discovery by Eastern travellers.

The most interesting part of Isdubar's adventures is that relating to the *DRAGON*, which corresponds in a very curious manner to the account of the Hebrews preserved in the Old Testament. This is told to Isdubar by a relative of his who plays the part of a wise and God-fearing man, named Hasis-Adra—the Babylonian Noah, the builder of the ark, or rather the "ship," as it is here called. The occupation of Isdubar as a mighty hunter, and many other circumstances of other parts of the poem, quite fix him as the king called Nimrod in Genesis x. The twelve cantos of the Nimrod epic correspond to the twelve signs of the zodiac, and each one answers by its subject to the constellation whose number it bears. Thus the second canto on Eabani, the ox-man, the great friend of Isdubar, corresponds with the sign *Taurus* (the bull). The friendship of the two heroes, who become like brothers, occupies the next canto, which might be called *Gemini* (the twins). The sixth canto answers to *Virgo* (the maiden), in that it deals with the love of the goddess Ishtar for Isdubar. He rejects her love, as she has proved a very Circe to men before, provokes her anger, and meets with a terrible sickness as

punishment. The account of this part of the poem is very complete in the fragments. It is in travelling to the wise Hasis-Adra for his advice and cure that he learns the story of the great deluge of the last generation. On the road he encounters the scorpion-men (*Scorpio* is another sign of the zodiac), and has other adventures, most of which are not in the tablets as yet discovered and deciphered. Probably the archer and the goat (*Sagittarius* and *Capricornus*) will be found to figure among them in their proper places if another fortunate "find" is made. Finally, the eleventh canto, the account of the deluge, is appropriately level with *Aquarius* (the water carrier). The Nimrod epic was very popular apparently, for the fragments we have belong to several different copies.

ISÈRE, a department in France, formed out of a portion of Dauphiné, is bounded E. and N. by Savoy and the department of Ain, S.E. and S. by the department of Hautes Alpes, S.W. and W. by those of Drôme and Rhone. Its length from north-west to south-east is 94 miles; the average width is 41 miles. The area is 3290 square miles, and the population in 1882 was 580,271.

General Aspect.—The surface of the department presents perhaps the most varied and picturesque scenery in France, ranging between the extremes of the bleakest barrenness and the most smiling and luxuriant fertility. The cols of Saix and Sept-Laux, and the peaks of Granier and Belledonne, rise respectively to the height of 10,968, 9742, 9810, and 9731 feet above the level of the sea. The mountains abound in grottoes of great extent, and are rich in stalactitic concretions. The lakes are numerous, but small. There are no navigable canals; but canals and rills of irrigation are employed very extensively in most of the valleys and plains. Every spot capable of cultivation is carefully tilled; the mountain sides are shaped into terraces, which are formed with earth, supported by walls of dry stones; and crops are grown at the height of 2700 feet above the level of the valleys.

The arrondissement of Grenoble contains no plains; the tillage is confined to the valleys and mountain slopes. The valley of Grésivaudan, remarkable for its extraordinary fertility and high cultivation, is watered in its whole length by the Isère, and extends from the point where that river enters France to its junction with the Drac in the neighbourhood of Grenoble, a length of 29 miles, with an average breadth of 3 miles. It is inclosed in its whole extent by two chains of mountains of great and varied beauty, the lower slopes of which are converted into corn fields, meadows, orchards, and plantations; the central parts are covered with forests of oak, chestnut, and pine, or clothed with pasture; while the summits and crêtes are covered with snow or with naked rocks. In the valley the walnut, mulberry, and vine flourish. Wheat, barley, maize, hemp, clover, &c., are produced in great abundance. Rye and oats are the chief crops in the mountain districts. Oxen are employed in farm-work. Numerous flocks from this and the neighbouring departments graze upon the mountain pastures during the summer. The arrondissement of St. Marcellin presents towards the north a vast plain, known under the names of Bievre and Côte St. André, consisting of a dry gravelly soil, which is tolerably fertile and well cultivated. The centre of this arrondissement is hilly, and contains some good wheat land. Another part of the arrondissement is the valley of Tullins, a prolongation of that of Grésivaudan, to which it yields neither in beauty nor fertility. The southern part of the arrondissement of La Tour du Pin, known as the Terres Froides (cold lands), consists of high ridges divided by narrow vales, while the northern part consists of hills of moderate height, intersected by moist and marshy plains. In this part are the lakes of Paladru and Lempis, and the extensive morasses of Bourgoin. The arrondissement of Vienne presents in its northern part a vast dry sandy

plain, on which rye is the chief crop; in the central parts it is covered with hills, the lower slopes of which are well cultivated and very productive, while their summits are covered with wood; to the south this arondissement comprises the extremely fertile plain of Valoir, which yields corn, wine, oil, and silk.

Rivers.—The department takes its name from its principal river, the Isère, which, rising on the western slopes of the Graian Alps in Savoy, flows in a general westerly direction to Montiers, whence its course is north-west for a few miles, then south-west to its junction with the Arc and as far as Montmeillan, where it becomes navigable. Here its course is nearly south to Grenoble, where it is joined by the Drac from the left bank; before this point it makes another bend first to north-west, then to south-west, passing St. Marcellin, below which town it enters the department of Drôme, and falls into the Rhone a few miles above Valence after a course of 150 miles, 90 of which are navigable. This river, though subject to disastrous floods, is of moderate width, but very deep; its waters are always of a blackish tint, owing to the debris which it receives from the slate quarries of the Tarentaise. Of the other streams the most important are the Drac [see ALPES, HAUTES]; the Romanche, which drains the south-east of the department and joins the Drac on the right bank, a few miles south of Grenoble; the Bourbre, which rises south of Virieu, and flowing past La Tour du Pin and Bourgoin, enters the Rhone on the northern boundary of the department; the Guiers, which is formed by the union of the Guiers-Vif and the Guiers-Mort (two streams that run down from the mountains of the Grande Chartreuse), and flows along the frontier of Savoy from Les Echelles to its junction with the Rhone a few miles south of Belley. The RHONE forms the northern and western boundaries of the department, and is navigable.

Natural Products.—The productions are of the most varied description, including wheat, rye, barley, maize, buckwheat, pease and beans, potatoes, fruits of all kinds, almonds, medicinal plants, hemp, &c. Vines are mostly grown in the fertile valleys, trained either to greenwood supports of maples or cherry trees, or to dry tall poles of chestnut wood; vines thus grown are called high vines (*hautains*). But on the hill slopes in favourable situations and in the Rhone district the low vines, as they are called when unsupported, produce a stronger, better-keeping wine, and more fitted for transport. The produce of wine in ordinary years is about 5,500,000 gallons, the best of which is produced in the neighbourhood of the Rhone. Horses, asses, and cows are numerous, but small, the former being celebrated for their activity; mules of large size are reared in the mountains; sheep are bred in great numbers, and yield a fine silky wool; pigs, goats, and poultry are plentiful. The rivers and lakes abound in fish. Game is abundant; among the wild animals are the bear, boar, wolf, chamois, ibex, porcupine, weasel, red and gray partridge, &c. The mulberry grounds are extensive.

The climate is healthy: cold in winter, very hot in the valleys and plains in summer. The prevailing winds are from the north and north-west; about eighty-five days in the year are rainy; hailstorms are sometimes very destructive.

In mineral wealth the department is very rich. Iron, lead, copper, and coal mines are worked; gold and silver mines have been worked, but are now abandoned. White marble, granite, porphyry, gypsum, and slate are quarried; antimony, zinc, cobalt, rock-crystal, lithographic stones, lignite, vitriol, and sulphur are found.

Manufactures.—The industrial products consist of sail-cloth, table and house-hold linen, gloves, soldiers' uniforms, cannons, calicoes, printed cottons, oil, turpentine, liqueurs, and mineral acids. The gloves called Grenoble, from the place where they are made, bear a high reputation. There are

iron, copper, and lead foundries, steel works, zinc and copper rolling factories, marble sawing mills, paper and vellum works, naileries, dye-houses, glass works, cotton yarn manufactories, and silk-throwing establishments.

The department is divided into the four arrondissements of Grenoble, La Tour du Pin, St. Marcellin, and Vienne. The capital of the department is the town of GRENOBLE.

ISERINE is a titaniferous iron sand first found near the source of the river Iser in Silesia. The grains are mostly regular octahedra, probably pseudomorphs after magnetite, or possibly modified rhombohedrons of ilmenite; with it are associated magnetite, garnets, and quartz. Iserine occurs in many rivers and along the sea-coast in the British Isles, also in the eruptive rocks of Arthur's Seat, and beds of it occur in the Tertiary of New Zealand and Victoria, where it has been worked as a source of iron.

ISETHIONIC ACID is isomeric with ethyl-sulphuric or sulphovinic acid. It is a viscid liquid, of the formula $C_2H_4SO_4$. It is a strong acid, and yields crystalline salts, mostly soluble in water, called isethionates.

ISIDORE, ST., of Pelusium in Egypt, lived in the beginning of the fifth century (died in 450), and wrote, according to Suidas, "3000 epistles, explaining the divine Scriptures." Upwards of 2000 are still extant, but are usually held to be chiefly spurious. Best edition, Scholt (Paris, 1638).

ISIDORE, ST., born at Carthage in 570, was bishop of Seville from 600 to 636. He was considered by the Council of Toledo (633) as the most learned man of his age. He also presided at the second Council of Seville in 619. The works of Isidore, which are numerous, have been published by Du Breul, Paris, 1601, and Cologne, 1617; at Madrid, 1778, and by Arvati, Rome, 1797-1803. The councils of Seville and Toledo, over which Isidore presided, were not merely church assemblies, but civil parliaments; and that too of such importance that their decrees form the basis of the whole constitution of the Spanish kingdoms during the dark ages. He was an indefatigable literary collector, and his works contain many fragments which are preserved to us only by this means. He not only was learned in Greek and Latin literature, but in church history, and he collected a most important series of early church documents, which if it could only be found would be of priceless importance. It was held of such great value in early times that it formed the cause of one of the most famous forgeries of the world, the "Isidorian Decretals," more commonly called the *False Decretals*, which are spoken of in the next paragraph. To these immense acquirements the great bishop added music, and it is to him that we owe the earliest certain mention of harmony in the world, that is, the production of musical compositions for more than one part or voice. Isidore speaks of the *symphony* (concord) and *diaphony* (discord), into which the rude harmony of the time was divided. The treatise is called "Sententia de Musica." It is from the learned Isidore that St. Gregory of Rome (Gregory I.) is supposed to have derived much of his musical knowledge. St. Isidore died 636, ordering on his deathbed all he possessed to be given to the poor.

ISIDORIAN DECRETALS. These *False Decretals* were a forgery made between 835 and 845. Up to that time the Decretals of the popes, governing the practice of the church, began only with Pope Siricius towards the close of the fourth century. To this collection (made by Dionysius) was added the reports of the authentic councils bearing the name of Isidore of Seville. Suddenly, says Milman ("Latin Christianity," book v.), there was promulgated, not absolutely unquestioned, but overawing all doubt, a new code of Decretals adding fifty-nine letters and decrees of the twenty oldest popes, from Clement to Melchisedech, and the DONATION OF CONSTANTINE (the ultimate foundation of the temporal possessions of the church), as

well as inserting among the genuine decrees of later popes and accounts of councils from Sylvester to Gregory II. thirty-nine false decrees and accounts of several irregular councils. The False Decretals contain passages from the Council of Paris (829), and must therefore be of later date, while, as Benedict of Mentz mentions them, they must be anterior to 847, when his supplement to the capitularies appeared. They seem to have been promulgated at Mentz. "The False Decretals do not merely assert the supremacy of the popes, they comprehend the whole dogmatic system and discipline of the church, ending with the appeal to Rome. They are full and minute on church property, and on ceremonies, ordinations, sacraments, fasts, and festivals, the chrisin, holy water, consecration, sacred vessels and habiliments. The whole is composed with an air of profound piety and reverence, occasionally rising to beauty in its moral and religious tone. But for the too manifest design to aggrandize the see of Rome and the monstrous ignorance of history, which betrays itself in glaring anachronisms and in utter confusion of the order of events and the lives of distinguished men, the False Decretals might still have maintained their place in ecclesiastical history. They are now given up by all, not a voice is raised in their favour" (Milman). Before the Reformation Nicholas of Cusa had thrown doubt on this important collection, but the Magdeburg centuriators and Contius in 1586 altogether exposed the fraud; and when their evidence was suppressed, Blondel in 1628 demolished those who still upheld their authenticity with unanswerable arguments. At the same time the rapid acceptance of the False Decretals by all Christendom showed that no new claims were made by Rome, but it was merely sought to substantiate and strengthen traditions and claims already fully known. Besides, as Roman Catholic apologists point out (while frankly admitting the fraud), so many points of discipline and order could not possibly have been imposed upon the church at once and without preparation. In all probability sanction was sought to be given to customs already in full play by this daring resource.

Deceived as we may charitably assume (since we know that practically all Christendom was deceived) by this pretended relic of the great Isidore, Pope Nicholas I. in 865 publicly acknowledged the Isidorian Decretals as the great secular authority for the supremacy of the Roman see. Leo IX. (1048-54) appealed to them constantly. Hildebrand (Gregory VII., 1073-85) made them the basis of his system. The Council of Florence in 1437, and the Council of Trent in 1563, used them as genuine. But though Contius was put down in 1586, Blondel (1628) was unanswerable. His book was placed in the Index, but eventually Pius VI. in 1789 had to confess that these famous Decretals were a forgery. Milman's "Latin Christianity" (fourth edition, London, 1883), Walter's "Kirchenrecht," Gfrörer's "Geschichte des Urchristenthums" (Stuttgart, 1839), and Mohler's "Collected Writings" (Ratisbon, 1810), are the best Roman Catholic apologies on the subject.

ISINGLASS, a fine fish-gelatin, was originally obtained from the common sturgeon only, and consisted of the dried air bladder of that fish. This is still the source of the finest qualities, which are prepared by cutting open the sounds, steeping them in water till the outer membrane separates from the inner, then washing the latter and drying it in the air. The best isinglass comes from Russia, where it is obtained from several species of the sturgeon found in the Volga and other tributaries of the Caspian Sea, in the Black Sea, and in the Arctic Ocean. It is also obtained from the sounds of many other fishes, and large quantities are now imported from Brazil, Guiana, Manila, the East Indies, and from Canada. It is chiefly used for clarifying wine, beer, and other liquids, large quantities being used by brewers for this purpose. Its fibrous struc-

ture seems to be that which gives it its chief value in this respect, the crossing threads forming a fine network in the liquid, which mechanically carries down all the minute particles that render the liquor cloudy and turbid. An inferior kind of isinglass made from cod sounds and sole skins is also used for this purpose.

ISIS, one of the chief deities of the Egyptians, the wife of Osiris and mother of Horus, was represented as the goddess of fecundity, and the cow was sacred to her. The annual festival of Isis in Egypt lasted seven days, during which a general purification took place. The priests of Isis observed perpetual chastity, their heads were shaved, and they went barefooted. The goddess was often represented as a woman with the horns of a cow. [See Io.] She also appears with the lotus on her head and the sistrum in her hand; and her head in some instances is seen covered with a hood. Heads of Isis are a frequent ornament of capitals on the pillars of Egyptian temples. By the Greeks Isis was generally identified with Démêtér; by the poets and philosophers she was regarded as the type of Pantheistic divinity.

The Roman aristocracy patronized the worship of Isis largely on its introduction under Sulla, 86 B.C.; one of the best temples in Pompeii is that of this goddess, and the secret passage of the priests up to the back of the image of the goddess whence the oracles were delivered is yet to be traced there. This power of oracles, the lofty truths of Egyptian philosophy, the assumed austerity of the priests, &c., fascinated the mind of the wealthy, luxurious, novelty-loving patricians of the late republic and early empire.

In B.C. 43 the senate had built a temple of Isis at Rome, but Augustus forbade the worship. His successors in the empire found themselves compelled to permit it on account of its popularity. Under Hadrian it was at its greatest height of power. Its gloomy mysticism awed the ignorant, and the lower orders were ardent votaries of the unknown goddess as the rich. Even in distant Britain Isis had her temples.

Isis came to be the moon-goddess and Osiris the sun-god; but the great myth of Isis is the Egyptian counterpart of the Greek myth of Démêtér, and the Teutonic myth of Baldur, typifying the apparent death of the earth in winter, and its revival in spring. Osiris was killed by Typhon, and Isis, after much searching, found his coffin. Continually weeping over it she made the Nile-flow. Every year her grief is renewed, for every year Osiris dies, and a tragic drama is played through. Typhon recovered his body and cut it up, strewing the mutilated fragments all over Egypt. The sorrowing Isis set out afresh and collected all the remains (or nearly all, some parts she never found) and buried them at Philæ. The worship of Isis became enlarged and spiritualized in its best forms, till it melted all nature. She was "mother Isis," the mother of all. There was a noble inscription found on her veiled statues: "I am that which is, has been, and shall be, and no man has lifted my veil," which well embodies the "open secret" of nature. Apuleius has preserved for us a fine hymn to her: "Theu whom the gods cherish and the demons obey, who rulest the world, lightest up the sun, governest the universe; to thee the stars reply, the times return, the elements bow down: flame ascends at thy nod, seeds germinate, women are fruitful," &c. ("The Golden Ass").

ISLAM or **ESLAM** is the name given by the Mohammedans to their religion. It denotes entire submission to the will of God, and by the more devout and thoughtful of them it is regarded as expressing the essence of their theology. It is also used to designate the acceptance of the revelations, commands, and ordinances given by Mohammed, and corresponds with our own term Christianity. The man who accepts Islam as his faith is a Moslem, often incorrectly rendered Mussulman. See **MOHAMMADANISM**.

ISLAND is a small tract of land entirely surrounded by water. The formation of islands at different periods is among the most remarkable phenomena in the great history of nature. Some have arisen from the coral beds in the bosom of the ocean, others from volcanic action, and some are probably the summits of mountain ranges of continents slowly rising to or sinking beneath the ocean level. Of the volcanic origin, innumerable evidences have presented themselves both in ancient and modern times. Within the period of authentic history several small islands have been known to emerge from the depths of the Gulf of Santorin, in the Grecian Archipelago. Nearly two centuries before the Christian era the small island of Palaia Kameni made its appearance; and in the year 1573 the Little Kameni was thrown up, amidst a cloud of vapour and the discharge of pumice stone. In 1707-9 another island, the result of submarine volcanic action, suddenly made its appearance, called the New Kameni, which still sends forth sulphurous vapours. There is an instance, mentioned by Kircher, of an island connected with the Azores, which was thrown up in 1538; and another in 1587, when an earthquake agitated the island of St. George, and near its shores arose eighteen small islands. There are instances where islands, after suddenly rising into existence have begun to subside, and then gradually disappeared, or remained as shoals just below the surface of the water. Of these temporary islands the most curious is that of Sabina, in the neighbourhood of the Azores, which, in 1811, emerged near the coast of St. Michael. It first arose from the depth of 240 feet, and rapidly obtained the height of 300 feet, and formed an island about a mile in circumference. In a few months it began gradually to subside, and in 1813, where Sabina once stood there was a depth of 500 feet. In the year 1783 an island was formed by elevation about 70 miles from Cape Reykiavik in Iceland. It consisted of lofty cliffs, which emitted smoke and fire, with immense quantities of pumice, that covered the sea for above 100 miles around. The King of Denmark laid claim to this newly-formed territory, and called it "New Island;" but before the expiration of a year it made its disappearance, leaving nothing but a rocky reef to denote the spot where it formerly stood.

In the great Indian and Pacific oceans these volcanic operations have been constantly at work. Barren Island, in the Indian Ocean, is one of the most remarkable volcanic formations now in existence. It is about 6 leagues in circumference, and emits, from a central cone about 1900 feet high, showers of red-hot stones of 3 or 4 tons in weight, which are thrown to a distance of many hundred feet beyond the range of the island.

The great islands which are situated close to continents, or which are not too remote to appear never to have belonged to one great mass of land on maps, are somewhat numerous. Among them must be included the following: Tierra del Fuego, at the southern point of South America; Vancouver Island and some others north of it, on the west coast of America; the Japanese Islands and Sumatra, off the east coast of Asia; Tasmania (or Van Diemen's Land), to the south of Australia; Ceylon, to the south of Hindustan; Madagascar, to the east of Africa; the British Islands; Sicily, Cyprus, Sardinia, and Corsica, and others in the Mediterranean; Newfoundland, off the east coast of North America; and Cuba, Jamaica, San Domingo, and Trinidad, in the West Indies. There is no doubt that all these islands were once connected with the mainland nearest to them. The word "once" has, however, a very wide signification so far as lapse of time is concerned, and it must be remembered that the physical geography of the present age was foreshadowed and prepared during not only the last geological age, but during several antecedent epochs. If the proof of the former connection of certain islands with the mainland depended on perfect similarity of the

animals and plants of both localities alone, the evidence would fail in some instances, but the geologist is able to show in those cases that the construction of the surface of the earth was the same then in the island and on the continent, but possibly so long ago that the plants and animals have not much now in common, and that still there can be no doubt about the former continuity of land. Thus in Madagascar the fact that its mammalia differ entirely in all their essential characteristics from those of the neighbouring continent is accounted for by assuming that so long ago was the separation of the island from the continent, that it was before the world of monkeys enlivened the African forests, and before the great animals of the continent lived. The pigny hippopotamus—the fossil remains of which have been found in Madagascar—still lives in Liberia.

ISLAY, an island of Scotland belonging to the county of Argyre, and the southernmost island of the Hebrides. It is separated from Jura by the sound of Islay, which varies from half a mile to 6 miles in breadth, and which, owing to the rapids caused by their difference in width, is often dangerous to navigate. The area is 235 square miles, the length 25½ miles, and the breadth 19 miles. The population in 1881 was 7512. Though less bold and broken into glen and mountain than the Hebrides and Highlands generally, it presents considerable diversity of scenery. As a rule the coast is flat, but there are high cliffs at the Mull of Islay. The soil is very fertile, and in many places yields better crops than the average of Southern Scotland. The exports are chiefly live stock, dairy produce, and whisky, for the manufacture of which there are seven distilleries. Slate and marble quarries are worked, and valuable iron, lead, and silver ores have been obtained. The island contains numerous trout and salmon streams, and several fresh-water lakes. There are landing piers at Port Askaig, Port Ellen, Bowmore, Port Charlotte, and Portnahaven. Of antiquarian interest are some Scandinavian remains, dating from the period before the island was held by the kings of Man, from whom it passed to the Lords of the Isles and became identified with the history of Scotland.

ISLE OF MAN. See MAN, ISLE OF.

ISMAELITES or **ISMAEL'ANS** were originally a branch of the Shiites, or followers of Ali ben Abi Taleb. Djafar Madeck, the sixth Imam in a direct line from Ali, having lost his elder son Ismael, appointed his younger son Mousa to be his successor. This caused a schism among the Shiites in the second century of the Hegira. Those who contended that the office of Imam ought to have descended to the posterity of Ismael, and not to his younger brother, were called Ismaelites. They established two powerful dynasties, one in Egypt and another in the Irak Ajemi of Persia. The Ismaelites of Persia, Syria, and Arabia had frequent wars against the Abbasside caliphs and the other Sunnee Mussulmans, until the dynasty of Casbin was overthrown by the Tartars about the middle of the thirteenth century. After that time the Ismaelites became scattered through Asia, maintaining their tenets and observing their rites in concealment and obscurity.

ISMAIL', a town of Bessarabia belonging to Russia, with a population of 30,000. It is strongly fortified, and under the Turks it had numerous mosques, bazaars, and large dwellings, but it has never regained importance since it was taken in 1790, after a long siege, and given over to military execution by the Russian general Suwarrow. The horrors of this famous siege have been described by Byron in his "Don Juan."

ISMAIL'IA, a town in Lower Egypt, south-east of Cairo, and situated about half-way across the Isthmus of Suez. It clusters upon the north shore of Lake Timsah, at the junction-point of the fresh-water canal from Cairo and Zagazig with the grand ship canal, before the latter

bends southwards to Suez. It is a busy and picturesque little place, with a church, mosque, hotel, shops, bazaars, and several handsome edifices. It owes its prosperity, and almost its existence, to the Suez Canal, which unites the Red Sea with the Mediterranean. The fresh-water canal runs in front of it, and is bordered by trees and shrubs, making Ismailia quite an oasis in the desert. It was the scene of great activity during the English operations in Egypt in 1882.

ISOBARS or **ISOBAROMETRICAL LINES**, are continuous lines drawn upon maps through all places where the readings of the barometer, after due corrections for temperature, elevation above sea-level, &c., have been made, are identical at a given time. Usually isobars are drawn at every tenth of an inch of barometric pressure. From the nature of the case the single observations are made from day to day or hour to hour, and the isobars drawn on the chart afterwards. Many of the daily newspapers (as the *Times* of London, &c.) publish isobars for the day before. As the changes in the atmospheric pressure are very valuable indications of coming weather, the isobars are of great help. From them we may learn how the currents of wind in the air are behaving, and therefore in many cases we can predict how they will behave. Between two successive isobars there is a difference of a tenth of an inch of mercury of pressure, and when the isobars are close together we say there is a steep gradient, when they are wide apart we say there is a gentle gradient. Barometrical gradients are usually expressed in England in hundredths of an inch for the mercury, and in degrees of 60 nautical miles for the surface; thus a gradient of four means that over 60 nautical miles the barometer rises .04, or a twenty-fifth of an inch. Steep gradients imply high winds, gentle gradients gentle breezes. A gradient of six gives a strong wind, a gradient of ten a stiff gale. The direction of the wind is *down the gradient*, not perpendicularly across the isobars, but with a somewhat circular or whirling curve. In the northern hemisphere if an observer stands with the high barometer to the right and the low barometer to the left hand, then the wind will blow on his back. Therefore the course of the isobars indicates the course of the wind, just as their distance apart indicates its strength. The course of the wind with relation to the isobars is exactly the converse of the above in the southern hemisphere, where the high isobar to the right hand and the low isobar to the left would place the observer with the wind blowing on his face. If in any area the pressure is lower than in the parts around the area, the wind will blow (in the northern hemisphere) in the opposite direction to the hands of the watch, somewhat converging towards the centre of the area. This is called a cyclone. Areas of high pressure of course give rise to anticyclones.

ISOCROMATIC LINES are those coloured rings which appear when a pencil of polarized light is transmitted along the axis of a crystal, as mica or nitre, and reaches the eye after passing through a plate of tourmaline.

ISOCLINES or **ISOCLINIC LINES** (Gr. *isos*, equal; *klinein*, to incline) are lines of equal *dip* or vertical *inclination* of the magnetic needle. They may be roughly called the lines of magnetic latitude. [See ISOGONES, INCLINATION.] In England the isoclines run from W.S.W. to E.N.E.

ISOGONES or **ISOGONIC LINES** (Gr. *isos*, equal; *gonn*, an angle) are the lines of magnetic longitude, just as *isoclinic lines* are the lines of magnetic latitude. They are lines of equal declination, that is, of equal angular deflection from the true north of the magnetic needle, which points not to the earth's north pole, but to the magnetic north pole. [See ISOCLINES, DECLINATION.] In England the isogones run, roughly speaking, N.N.E. to S.S.W., and vary from 20 to 17 degrees of declination.

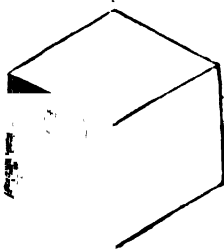
ISOMERISM, a term employed by chemists to designate compounds which have the same ultimate composition, but nevertheless are different compounds, having different properties. Isomeric or metameric bodies have the same percentage composition; if the different bodies have also different molecular weights they are called *polymeric*. Butyric acid and acetic ether have the same molecular weights, and are isomeric or metameric; the formula of each is $C_4H_8O_2$, and the molecular weight is 88. Butyric acid and aldehyde, although of the same percentage composition, have different molecular weights, and are therefore *polymeric*,—the formula of aldehyde being C_2H_4O , and its molecular weight 44, or half that of butyric acid. All these bodies differ widely in their properties. Many organic bodies are isomeric, and many of these are extremely varied and complex in their constitution, though of the same ultimate composition.

ISOMETRICAL DRAWING. In the delineation of architectural subjects by the method of plan, elevation, and section, or by "parallel projection," as it is sometimes termed, each view of the same subject requires a specific and separate drawing. The most obvious advantage of this method of constructing drawings of mechanical or architectural subjects is that one scale will serve for all the views, however numerous. But while useful, and very indispensable in a vast range of subjects, it is totally deficient in another important requisite—namely, the showing the relative position of horizontal and vertical planes, or the connection of lines which are drawn in a horizontal plane with those drawn in a vertical one. Thus, in the delineation of a plan, the whole details are confined to plan, no lines representing the parts in elevation being capable of delineation. Hence the introduction of methods of delineation, by which, in one drawing, the connection of horizontal and vertical planes could be plainly shown. The true method of accomplishing this is known as **PERSPECTIVE**. This species of delineation is not, however, applicable to practical purposes in which measurements are required of the various parts of the subject, inasmuch as, from the principles of the style, the lines recede from one another, as in actual vision, as they draw nearer to the front of the picture, by which the effect of distance is produced; thus different scales would be required for the different parts. To obviate this inconvenience, various systems of projection have been introduced. The species of projection, known as **isometrical**, is the only one by which lines drawn in horizontal and vertical planes combined can be measured from one scale.

The term **isometrical** is compounded of two Greek words, signifying equal measurements, and was given by Professor Farish of Cambridge, who first elucidated its practical usefulness, to that species of projection by which the representation of a cube was obtained, the lines of which forming the boundaries of the sides were all equal.

To draw the isometrical representation of a cube, as in fig. 1: let the square, $ABCD$ (fig. 2) be one face of a cube. Draw the two diagonals, AD and BC ; make the angle, ANC , equal to 30° ; then take AN as a radius, and with it describe a circle (fig. 3); with the same radius, which is equal to the side of an inscribed hexagon, divide the circumference of this circle into six equal parts, and draw three radii from the point 1 to the points 3, 5, and 7; then form the hexagon by joining the points 2, 3, 4, 5, 6, and 7. Or, for general purposes, these lines may be more conveniently drawn by the aid of simple instruments.

Fig. 1.



Thus, let F represent the blade of the drawing-square, and α the template, formed to set off the three angles, 30° , 60° , and 90° . By placing the square blade as shown in the figure, and applying successively the different edges of the template α to the edge of the blade, it is obvious that each of the angles at 1 may be marked off on the paper. In this operation the drawing-square may be placed either horizontally or vertically to the work.

If fig. 2 represents the exact size of the face of any cube, then figs. 1 and 3 will, at a moderate distance, appear to be correct representations of a cube of

that magnitude, of which they are exact projections. If each face of the cube be 100 feet square, then will A u (fig. 2) be a scale of 100 feet, by which the length of any line, or the distance between any points on or within the cube, may be ascertained, and by it the plans, elevations, and sections of any object may be drawn. By the same scale, also, the major diagonals, 85, 57, or 73, on the three faces of the representation of the cube in fig. 3, marked respectively A , u , c , may be measured.

The isometrical drawing (fig. 4) of the interior of a cubical box is illustrated by the diagram in fig. 5. The sides of the box, a , b (fig. 4), are the faces of a cube, of which a , b , c (fig. 5), are the upper boundary lines. The extent of opening is obtained by drawing a diagonal, a , c ,

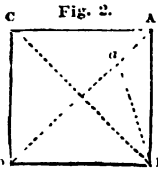


Fig. 3.

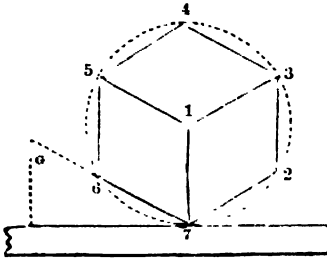


Fig. 4.

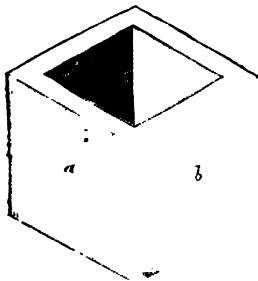


Fig. 5.

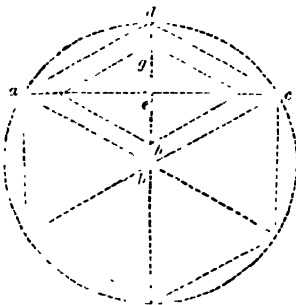


Fig. 6.

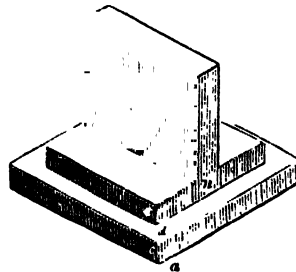


Fig. 7.

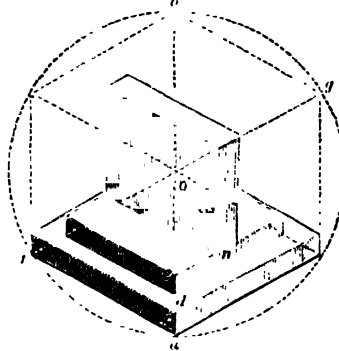


Fig. 8.

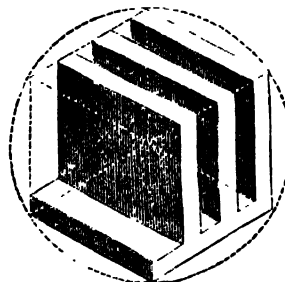


Fig. 9.

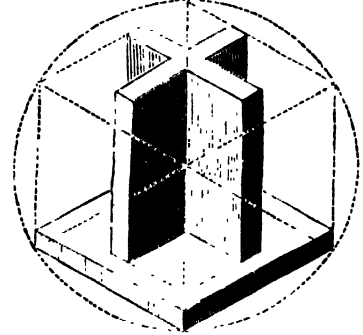


Fig. 10.

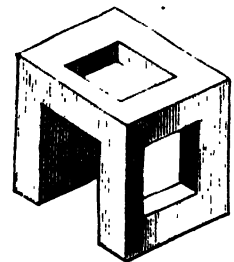
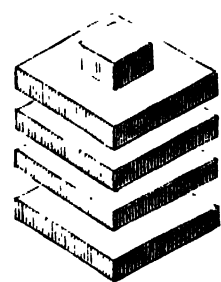


Fig. 11.



cutting b d in e , and from this point setting off to g and h ; and from these points drawing lines parallel to the sides, e a , d , e , c b , b a ; these lines being put in by the aid of the template, as in fig. 3. The object represented in fig. 6 is contained within the cube shown by the dotted lines (fig. 7). The height of the various steps, as a , c , d , e , (fig. 6), being set off from a , in the line a , b , to c , d and e . Lines from these points being drawn parallel to the side a , f , or b , g , and g , o , the position of the point n is obtained by measuring from e to n ; and from this point drawing a line parallel to a , b . In like manner the methods of delineating other objects are shown in figs. 8, 9, 10 and 11.

ISOMORPHISM, a term applied by chemists to those bodies which crystallize in the same form. It was shown by Mitscherlich that bodies having a similar chemical constitution have also the same crystalline form, and that analogous elements may replace one another without altering the form of the crystal; as, for instance, the protosulphates of zinc, iron, copper, and magnesia, which crystallize together in the same form, and are capable of replacing each other even in the same crystal; and in the compound alums, for instance, in the common alum, sulphate of potash, and alumina, where the potash can be replaced by ammonia, and the alumina by oxide of iron without altering the form of crystal or the proportion of water of crystallization. Large groups of such bodies are known, and many are found in nature as minerals.

The following are two remarkable groups of isomorphous minerals:—

Group of Isomorphous Phosphates.

Apatite,	$\text{Ca}_3(\text{PO}_4)_2 + \text{Ca}$	$\begin{cases} \text{PO}_4 \\ \text{F} \end{cases}$
Pyromorphite,	$\text{Pb}_3(\text{PO}_4)_2 + \text{Pb}$	$\begin{cases} \text{PO}_4 \\ \text{Cl} \end{cases}$
Minette,	$\text{Pb}_3(\text{AsO}_4)_2 + \text{Pb}$	$\begin{cases} \text{PO}_4 \\ \text{Cl} \end{cases}$
Vanadenite,	$\text{Pb}_3(\text{VO}_4)_2 + \text{Pb}$	$\begin{cases} \text{VO}_4 \\ \text{Cl} \end{cases}$

Group of Isomorphous Carbonates.

Calcite,	CaCO_3
Dolomite,	$(\text{MgCa})\text{CO}_3$
Magnesite,	MgCO_3
Siderite,	FeCO_3
Calamine,	ZnCO_3
Diallogite,	MnCO_3

ISOPLEURA is a subclass of **GASTEROPODA**. The molluscs forming this group are few in number but of extreme interest, as exhibiting traces of the primitive molluscan structure. The Isopleura are distinguished from all other gasteropods by a perfect bilateral symmetry. The intestine is straight or slightly coiled, and ends in the median line at the posterior end of the body. The gills, renal organs, genital ducts, and circulatory organs are all paired. This subclass includes the family **CHITONIDÆ**, forming the order **Polyplacophora**, and the genera *Neomenia*, *Proneomenia*, and *Chaetoderma*. The last three genera are worm-like forms, and have only recently been added to the molluscan subkingdom. These forms are destitute of a true shell, which is replaced by minute calcareous spicules. The radula or lingual ribbon is not much developed, there being only a single tooth in *Chaetoderma*. The foot is narrow and rod-like in *Neomenia*, aborted in *Chaetoderma*, its position being indicated by a longitudinal furrow. The alimentary canal is straight in *Chaetoderma*, expanded laterally into sacculi in *Neomenia*. The gills are represented in *Neomenia* by a number of filaments disposed symmetrically on either side of the anus, in *Chaetoderma* by two plumes in the same position. Neither *Chaetoderma* nor *Neomenia* possesses special genital ducts, the products of the genital organs being carried off by the renal ducts (*nephridia*), which open to the exterior near the anus.

The Chitons (*Chitonidæ*) present a higher development. The typical molluscan shell is present, but by a process of budding, as it were, has been multiplied into eight shells, disposed transversely and never truly articulated. The odontophore is well developed. The foot is a broad creeping disc. The alimentary canal is slightly coiled. The gills form a row of plume-like organs disposed on each side of the body; these organs vary in number from sixteen to twenty-eight pairs, being multiplied like the shell by metameric repetition. The nervous system is very

simple, there being no conspicuous ganglionic enlargements. There are no tentacles or sense organs on the head. The presence of special organs of vision and touch on the shell has been recently demonstrated. In the restricted genus *Chiton* there are no traces of eyes, but in some of the other genera they are present in enormous quantities on the parts of the shells.

ISOPODA is an order of crustaceans belonging to the subclass **EDRIOPHTHALMA**. Some of these crustaceans are aquatic in their habits, others are terrestrial, and many of the aquatic species are parasitic. As in the **Decapoda** (crayfish, crab, &c.), the body is made up of twenty segments; the thorax is distinct from the head, and consists of seven segments bearing seven pairs of walking legs, all more or less uniform. The first pair of antennæ are in the

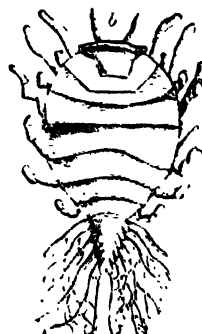


Gribble (*Limnoria terebrans*).



Sea-pill-ball (*Sphaeroma serratum*).

typical forms exceedingly minute, the second pair are long and tactile; the sixth appendage, answering to a maxillipede (foot-jaw) of the crayfish, forms a sort of lower lip covering the rest of the appendages of the mouth. The appendages of the abdomen are converted into respiratory organs in the form of large oval more or less membranous plates. The body is depressed. The sexes are often more or less dissimilar. The females carry their eggs under the breast, either between the scales or in a membranous pouch or sac, that opens to afford a passage for the young, which are hatched with the form and parts proper to the species, and only cast their skin as they increase in size. The greater number live in the waters. These



Mud-shrimp Louse (*Tone the mucus*): a, Male; b, Female.

which are terrestrial have need, like other crustaceans that live out of water, of a certain degree of atmospherical humidity, in order that respiration may be carried on, and that their branchiæ may be in a fit state for performing this function.

The first family of the Isopoda, **Oniscidæ**, are the well-known wood-lice, living on land in damp situations, in woods, gardens, and on the sea-coast. A species of the genus *Platyarthus* belonging to this family is found in ants' nests. The Pill Bugs (*Armadillo*) can roll themselves up like a hedgehog. The **Asellidæ** live chiefly in

fresh water, but their legs are better adapted for running than swimming; one of this family, the Gribble (*Limnoria terebrans*) lives in the sea, and does great damage by boring into the woodwork of piers, &c. Another family of walking Isopoda is Idoteidæ, which contains some of the largest forms, attaining a length of 4 inches; in *Arcturus* the young are carried for some time clinging on to the antennæ of the parent. In Tanaidæ the first walking legs are converted into a nipper (*chela*).

The second group are termed the Swimming Isopods. The species belonging to it have their feet more or less adapted for swimming, and the last segment of the abdomen forms with its appendages a large caudal fin. The Spharomidæ live on rocks on the sea-coast, and have the faculty of rolling themselves up in the form of a ball when touched or alarmed. They are all of small size, and several species are found in Great Britain, as the Sea Pill-ball (*Spharoma serratum*). Some of the aquatic isopods are parasitic, especially those belonging to the families Bopyridæ and Cymothoidæ. The Crab-lice (*Bopyrus*) live fixed under the vault of the branchial cavity of prawns, shrimps, &c., where they may be detected forming a small tumour. The males are five or six times smaller than the females, and are found attached to their abdomen. *Ione thoracicus* infests shrimps. *Ega* attaches itself to the exterior of fishes.

ISOPRENE, a volatile hydrocarbon obtained from india-rubber and gutta-percha by dry distillation. It has a specific gravity of 0.6823, and boils at 38° C. (100° Fahr.) The formula is C_5H_8 .

ISOPURPURIC or **PICROCYAMIC ACID** is an acid isomeric with purpuric acid. It is only known in combination; the formula is $C_8H_5N_5O_6$. It forms a great number of salts called isopurpurates. These are mostly crystalline, some with beautiful red, purple, and green colours. The salt of potash is obtained by acting on cyanide of potassium by picric acid; it occurs in red crystals with a green reflection. The other salts generally resemble the corresponding purpurates. The ammonia salt resembles murexide, and forms a beautiful purple solution in water.

ISOSCELES or **ISOSKELES** (Gr. *isos*, equal, and *skelos*, a leg), a term applied to a triangle of which two sides are equal.

ISOTHERMAL LINES (Gr. *isos*, equal, and *therme*, heat) are imaginary curves traced on the surface of the earth so that each may pass through a series of points at which the mean annual temperature of the air is the same. The situations of such points were first determined about 1817 by Alexander von Humboldt from the registers of observed temperatures in Europe, and from the numerous observations made by himself and other travellers in different regions of the world. The first charts were drawn by Dove, and published by the British Association in 1853. The mean annual temperatures of places remain nearly the same, but they decrease in going from the equatorial regions towards either geographical pole. At the level of the sea the value of the mean annual temperature is expressed by $M + E \cos. 2L$; where L is the latitude of the place, M is the mean temperature on the parallel of 45°, and $M + E$ is that at the equator. Usually three charts are required: one for the mean year, and one for the two extremes, January and July.

In the northern hemisphere, as we proceed eastward and westward from the meridians of Greenwich or Paris, it is found that the mean temperature on any parallel of latitude becomes continually less, and the severity of the winter greater than in this part of the world; and Humboldt found that between the parallels of 28° 25' N. and 41° 53' N. the difference between the latitudes of a place in Europe and a place in North America having the same mean temperature is about 7 degrees.

The period during which a traveller remains in any one place will seldom allow him to make a sufficient number

of observations for determining its mean annual temperature by the process above mentioned; but it is found that the mean temperatures for the months of October and April are very nearly equal to the annual mean temperature; also that the half sum of the temperatures at sunrise and at 2 p.m. is nearly equal to the mean temperature for the day. It may be proper to remark also that travellers, in making observations relating to temperature, should be careful to place their thermometers at some distance above the surface of the ground, and in situations where they may be unaffected by the reflection or radiation of heat from buildings, or from terrestrial particles in the atmosphere. The very high temperatures which have been occasionally observed in sandy deserts are probably owing in part to the latter circumstance.

The isothermal line of 32° passes about 4° southward of Nain, a Moravian settlement on the coast of Labrador; and continuing eastward through a point about 1° N. of Umea in Sweden, it there makes a remarkable inflection. After ascending as high as North Cape in Lapland, it abruptly returns southward, and attains its lowest limit in the eastern parts of Asia. Proceeding westward from Labrador, the curve descends towards the south, and crosses the lower extremity of Hudson Bay, from whence it again tends northwards to the great Slave Lake. The positions of the other curves seem to be influenced in some measure by that which has been just mentioned. In their progress from the western coast of Europe to the eastern coast of America they incline towards the terrestrial equator, yet so that the southern curves approach very near to parallelism with that great circle of the earth. At about 10° eastward of the meridian of Greenwich the curves have their convexities turned northwards, and further eastward they descend towards the equator. On the Old Continent the lowest isotherm (0° Fahr.) forms a closed curve near Jakutsk, about 135° E.; but over the region lying within the arctic circle off the north coast of America, portions of two curves are shown for 0° and -10° Fahr. The highest isotherms, 80°, are two closed curves, one in the north of South America and the other taking in the Guinea coast, Suez or near it, and the Seychelles Islands, thence stretching in a broad belt to about the meridian of 100°, and dying out about 140° W. These curves lie chiefly to the north of the equator, of course owing to the preponderance of land there. This cause it is which makes the curves in the southern hemisphere so nearly parallel to the latitude. But in every country the mean temperature varies with the height of the place above the level of the sea; and Herschel's computation still holds good, which makes the average diminution equal to 1° Fahr. for every 300 feet. It is observable that the curves of the northern hemisphere are much more irregular than those of the south, and that on the whole the northern hemisphere is the colder. But it must be noted that the map extends further north than south.

The curves formed by connecting, on the isothermal lines, points at which the mean temperature of summer is the same, are called *isothermal lines*; and those formed by connecting points at which the mean winter temperature is the same are called *isochimal lines*; both these systems of lines deviate more than the isothermal lines from the parallels of terrestrial latitude. Curve lines connecting points on the ground at which the mean temperatures of the soil are equal, are called *isogeotheim lines*; and according to Sir David Brewster, these are roughly parallel to the isothermal lines.

It was supposed that the mean temperature of the southern hemisphere was much lower than that of the northern, but recent observations show that what difference there is is exactly the other way; after all, however, there is little difference between the mean annual temperatures of places similarly situated in the two hemispheres.

Humboldt considered the mean annual temperature at the equator, at the level of the sea, to be equal to $81^{\circ}4'$ Fahr.; but Atkinson (*Memoirs of the Royal Astronomical Society*) has since ascertained that the mean temperature is there at least equal to $84^{\circ}5'$.

Of the point or points of maximum cold in the southern hemisphere, we as yet know positively nothing.

It is found, on boring into the earth, that the temperature increases at roughly about, with many local variations, the rate of 1° (Fahr.) for every 50 or 60 feet in depth. In the arctic regions the temperature of the ocean increases, but between the tropics it is found to decrease with the depth. At certain distances below the surface of the ground, which in Europe is between 60 and 80 feet, the temperature is found to be invariable, and in Java at only 2 feet; while in eastern Siberia the ground is permanently frozen to a depth of 700 feet.

ISPAHAN, a large city of Persia, in the province of Irak-Ajemi, situated 200 miles S.E. of Teheran, and though fallen from its former greatness, still one of the most populous towns of the country; it has 100,000 inhabitants. It stands in a beautiful and fertile plain on the banks of the river Zeinderud. The mud walls are 5 miles in circuit. The streets are crooked, narrow, dirty, and unpaved, like those of most Persian towns. It contains a great number of magnificent palaces, large private buildings, spacious caravanserais, and handsome bazars, most of which, however, are now in a state of decay. On the southern side three nobly-constructed bridges cross the river. The Maidan Shat, or Great Square, and the bazaar of Shah Abbas are both in a dilapidated condition. The most sumptuous of the palaces is the Chelch Sittoon, with its hall of columns inlaid with mirrors so as to resemble pillars of glass. The commerce and manufactures of Isfahan are considerable. The latter consist of woven fabrics, rich gold brocades, calicoes, chintzes, and other cotton goods, from the cotton raised in the neighbourhood; fire-arms, sword blades, glass, and earthenware are also made. The stone and seal cutters are famed for their workmanship. In the vicinity immense flocks of pigeons are bred for the profit derived from their manure, which is prized for rearing melons of the finest quality. Shah Abbas made Isfahan the capital of his empire and greatly embellished it. It ceased to be a royal residence about 1729, when Nadir Shah recovered it from the Afghans.

ISSUE, an ulcer artificially formed for the purpose of maintaining a constant purulent discharge from the body. It is usually made by placing one or more beads or peas in an incision through the integuments in one of the limbs, or in the neighbourhood of a diseased part, and there retaining them by adhesive plaster, so as to prevent the wound from healing, and keep it in a constant state of suppuration. Other issues are made by rubbing caustic potash, or potash and quicklime, on a part of the skin till it is destroyed and sloughs, and by keeping open the ulcer thus formed either with peas or very stimulant dressings. Setons are another form of issue, made by passing a broad flat needle beneath a portion of the skin, and retaining in the passage thus formed either a skein of silk or a flat band of caoutchouc. The moxa and the actual cautery are also sometimes employed with the same view.

Issues are sometimes had recourse to in order to restore a habitual discharge which has been checked by the cure of any chronic local disease, and the cessation of which has seemed to give rise to congestion of the head or of any internal organ. But the principal value of issues is as counter-irritants, by establishing a disease which is of itself unimportant in the neighbourhood of one which by its situation is more serious; and hence they are important means in the cure of chronic inflammations of many internal organs, and especially of those of the joints and of the spine.

ISSUE, in law, means the point or points in question at the conclusion of the pleadings, which are submitted to the jury.

IS'SUS, an ancient city, now lost, whose site was on the Issic Gulf, now the Gulf of Scanderoon, on the extreme south-east of Asia Minor. It is famous for the critical battle fought by Alexander the Great in a narrow valley, close by in 333 B.C. against Darius, king of Persia, deciding the fate of the civilized world. Its prosperity declined when one of the many Alexandrias (*Alexandria*, now Iskander or Scanderoon) was founded about 10 miles to the south of it.

ISTHMIAN GAMES were one of the four great national festivals of Greece, the others being the Olympian, Pythian, and Nemean. They were celebrated under the presidency of the Corinthians, near Corinth, on the isthmus which connects Peloponnesus with the continent, and were celebrated at regular intervals of two years, from 581 B.C. The crowns for the victors were of pine leaves originally, afterwards of ivy. The Isthmian games were still being celebrated in 362 B.C. (Clinton's "Fasti Hellenici.")

ITACOLUMITE is a schistose quartzite containing mica, which sometimes makes the rock quite pliable (flexible sandstone). It occurs in the Urals, North Carolina, Georgia, and in Brazil. It is interesting chiefly as the matrix in which diamonds are found. Gold also is found associated with it.

ITACONIC ACID, an acid obtained from citric acid by dry distillation. It is very soluble in water, from which it crystallizes in octahedrons. It is soluble also in alcohol and ether. It melts at 161° C. (322° Fahr.) The formula is $C_5H_6O_4$. It is dibasic, and forms both acid and neutral salts, called itaconates; those of the alkalis are soluble in water; those of lead, mercury, and silver are white insoluble precipitates.

ITACONIC ETHER is a colourless bitter oil, having the formula $C_5H_8O_4$. It boils at 225° C. (437° Fahr.)

ITA'KA WOOD, the timber of a tree indigenous to British Guiana, *Macharion Schomburgkii*. It affords a beautifully mottled wood much employed in cabinet work.

ITALIAN ARCHITECTURE. Instead of comprising buildings of every style and class to be met with in Italy, the term Italian architecture is generally restricted to signify that generic style formed by the revival of the Roman *classic orders*, and the adaptation of them, and other features derived from works of the same age, to buildings of every kind, domestic as well as public.

Different orders, or repetitions of the same order, being applied to the several storeys of buildings whose fronts were pierced with windows, it became unavoidably necessary to abandon all proportion of intercolumniation, and to space the columns according to the breadth of the piers and the apertures between them; which in turn left hardly any other alternative than to engage the columns themselves, that is, to attach either half or three-quarter columns to the walls.

One defect attending this practice of giving a separate order to each storey is that the columns become insignificant, both in proportion to the entire front and to the windows between them, more especially when the columns are further shortened by being placed on pedestals. In fact, windows and doors are generally the predominant features in Italian composition, even where two series are comprised within one order, being generally more prominent in their cornices and pediments than the other projections. They are often decorated with smaller columns or pilasters, and Palladio has sometimes loaded them by recumbent figures on the raking cornices of their pediments. Probably the Italian style exhibits itself to most advantage where columns have been discarded and windows and arches made the chief features in the composition, and the façade crowned by a bold and rich *cornicione*.

The finest examples of Italian architecture rank among the noblest buildings in the world. Thus St. Peter's at Rome (excluding the tasteless façade), which is chiefly due to the genius of Michelangelo, the library at Venice built by Sansovino, the many fine palaces of Palladio, our own St. Paul's—the masterpiece of Sir Christopher Wren—and other such splendid examples, are, in spite of many faults and incongruities inherent to this style, as to all imitative styles whatever, sources of delight and admiration. But when we think what original conceptions such men might have produced in Romanesque or in Venetian Gothic in the south and in pure Gothic in the north, our delight is mixed with regret at the grand opportunity half lost, half won.

The Italian style was for a long time predominant in England, and many of our finest public buildings are good examples of it; but after the first quarter of the nineteenth century a reaction fortunately set in, under the auspices of Sir C. Barry, Sir G. Gilbert Scott, G. E. Street, Pugin, and others, in favour of Gothic, which, when properly treated, is better adapted to our climate, and, it may be added, seems more in harmony with the national genius.

The other styles of architecture found in Italy are the Italian Gothic, especially the very fine Venetian Gothic, with a mixture of orientalism introduced in a most charming manner, and the Romanesque or Lombardic style. These are treated under their proper headings.

ITALIAN DRAMA. After the long sleep of the true dramatic and theatrical spirit in the middle ages the first endeavour to imitate the ancients in their theatre, as in other departments of art and poetry, was made by the Italians. Such were the Latin dramas of Mussato of Padua about 1330, &c. One of these Latin dramas, the "Lusus Eborum," by Secco Polentone, was translated into Italian in 1472, and printed as "Catania." This is probably the earliest printed drama in any modern tongue. The earliest represented drama in a modern language was probably the "Orfeo" of Poliziano, acted at Mantua in 1483; and next in point of date was a translation of the "Amphitruo" of Plautus, produced at Ferrara in 1486.

Among the successful earlier comic dramatists the most distinguished was Giambattista della Porta, who flourished at the close of the sixteenth century and the beginning of the seventeenth. Though most of his comedies were of the familiar species, and some of them even bordered on farce, yet a few rose to the noble and pathetic tone; of the latter kind are "La Furiosa," "La Cintia," "I Due Fratelli Rivali," "La Sorella," and "Il Moro." But the political influence of Spain on the Italian territory being then at its height greatly favoured the introduction of the Spanish taste in dramatic composition. It was probably the first extravagances of this dramatic innovation that induced Tasso, in his later days to compose, as a burlesque of the new romantic taste, a play entitled "Love Intrigues" (Gl' Intrichi d'Amore), which was acted in 1598 and printed in 1604. We find a curious evidence of the transitional state of the public taste at this time in the productions of a poet of high name who thought fit to try his powers in each of the rival species. This was Michelangelo Buonarroti the Younger, nephew of the great Michelangelo, who composed two comedies entitled "La Tancia" and "La Fiera." "La Tancia" is a rustic comedy, in which nearly all the characters speak the country dialect of Tuscany. "La Fiera" (the Fair) is a connected series of five plays in five acts each, which were performed at Florence on five successive nights. A vast variety of characters are introduced for the purpose of exhibiting instances of the technical terms used in the various trades of Tuscany.

The seventeenth century saw the rise to special favour of a species of comedy, or rather comic recitation, which in Italy seems to have been in all times peculiarly national. This was called the *commedia a soggetto* or *commedia dell'*

arte. It consisted of the mere outline of a dramatic composition, wherein the parts, very slightly sketched, were assigned to the several performers, who were to fill them up extemporarily. These sketches were called *scenarij*, from their containing merely the argument of each scene; those of Flaminio Scala were particularly celebrated.

The first endeavour to restore what the classicists denominated the *true comedy* was made at the beginning of the eighteenth century by Luigi Riccoboni, a theatrical manager (1674-1753), who made an unsuccessful attempt on the Venetian stage to revive the "Scalastica" of Ariosto. Better fortune awaited Carlo Goldoni, a Venetian (1707-93), who displayed such abundant nature and fertility in painting the manners and the follies of his own age and country, that at length he brought the comedy of character into vogue. He was for a time driven out of the field by the fantastic dramas of Gozzi (which were fairy tales adapted to the stage, and sometimes Spanish plays remodelled), but was speedily reinstated in Italian favour, and from his pen we have about 150 pieces. Among the comic dramatists of his own country he still occupies the highest place.

At about the same time Alfieri (1749-1803) inaugurated a new era of Italian tragedy. He adhered to the established classic school, took his subjects chiefly from ancient story, and was a strict observer of the unities. As a dramatist he was most successful in painting in his "Virginia" the public life of the Roman republic; and in his tragedy of "Saul" we find, with a certain Oriental splendour, great lyrical sublimity of expression. Since Alfieri the most estimable dramatic works are those of Vicozzio Monti and of Alessandro Manzoni. For some years, however, Italy has produced no great dramatist, and her theatrical genius has mainly been devoted to operatic compositions.

ITALIAN LANGUAGE AND LITERATURE.

The language called Italian is the written language of Italy, and exhibits the same analogy to the spoken language of Rome and Tuscany as the written language of England to the dialects spoken in its various counties. Several Italian dialects exist, of which we may enumerate the principal:—(1) The Milanese, spoken at Milan and in its vicinity; (2) the graceful Venetian; (3) the Mantuan; (4) the Piedmontese; (5) the Genoese; (6) the Bolognese; and (7) the Neapolitan, largely mingled with the ancient Oscan.

Owing to various causes the Tuscan dialect first attained polish, *verve*, and completeness, and gradually became the language in which the sages and poets of Italy thought and sung. Dante was the first great writer to use another medium than classic Latin, and even he writes his letters and his great treatise "De Monarchia" in Latin. But for that immortal epic of hell, purgatory, and paradise, which he calls "La Divina Commedia," he fortunately chose Tuscan. With that one poem he fixed, nay, he made, the Italian language. The other great writers of the fourteenth century, the *trecentisti*—Sacchetti, Villani, Petrarca, Boccaccio, &c.—were all Tuscans, and their genius has impressed on the language the stamp of the true Tuscan metal.

The second period, from 1400 to 1500, embraces the age of Lorenzo de' Medici, who was the friend of poets, and himself a poet of no mean pretension. It was illustrated by the splendid intellects of Poliziano, author of the "Orfeo," the earliest classic Italian drama; Luigi Pulci, the author of the "Morgante Maggiore;" and Boiardo, the author of the "Orlando Innamorato." Many of the learned men and women of this age, however, still elected to trammel themselves by writing in Latin.

From 1500 to 1600 is the third period of Italian literature, and a golden age of poetry, second only to the era of Dante. It is true, as Longfellow remarks, there appeared in it no one production that can bear a moment's comparison with

"The poem sacred,
To which both heaven and earth have set their hands;"

but it produced more great poems than any other period, such as the "Orlando Furioso" of Ariosto and the "Gerusalemme Liberata" of Tasso. It was also distinguished by the sonnets of Michelangelo, by the somewhat frigid elegance of Cardinals Bembo and Bibbiena, by the great labours of Machiavelli and Guicciardini in history, by the bitter satires of Aretino, by the quaint and invaluable art-history of Vasari, as well as by the graceful work of Vittoria Colonna in letters generally.

From 1600 to the present time forms the fourth period. To the brilliant era of the *cinquecentisti* succeeded the affectations and frivolities which ushered in the present age. The Italian mind, it has been said, contented or weary with the triumphs of the previous century, now found its chief expression in odes and sonnets, marked by conceits and exaggerated prettinesses of style, or in such artificialities as the curious "macaronic" poetry of Folengo.

The greatest poetic names of this period are Marini, Chiabrera, Redi, Filicaja, Maffei, Goldoni, Gozzi, Metastasio, Alfieri, Monti, Pindemonte, Ugo Foscolo, Manzoni, Parini, Silvio Pellico, Grossi, and Berchet.

Many of these names are associated with more than the poetic branch of literary labour. In criticism one must not forget Zeno, Baretti, Gozzi, Mazzuchelli, and Cesarotti; the fine arts occupied the acumen and industry of Lanzi, of Bottari, and of Milizia; Martini and Tartini are connected with the history of music; Verri, Neri, Carli, and Galiani wrote on political economy; Tiraboschi, Bettinelli, and Corniani on Italian literature; Buonafede on the progress of philosophy; Beccaria, Filangieri, and Mario Pagano on jurisprudence; Vallisneri and Spallanzani contributed important discoveries to our knowledge of the laws of nature and the conditions of animal life; Volta and Galvani are associated with the wonders of electricity and galvanism; Denina illustrated Italian annals; and Alfieri created the Italian tragedy.

Among the principal writers of the present century may be recorded—the historians Botta, Balbi, Amari, Scopoli; the tragedians Nicolini and Pellico; the romantic poets Grossi and Sestini; the didactic poet Arici; the satirist D'Elci; the dramatist Grisi; and novelist Manzoni, author of the "Promessi Sposi;" the novelist Rossini; and the dramatist Notta. Miceli has written the annals of Italy prior to the palmy days of Roman glory; Bossi, a general history of Italy; Vacani, the services of the Italian troops employed in Napoleon's wars; Colletta and Cuoro, the story of Naples; Pignotti, the history of Tuscany; Manno, that of Sardinia; and Coria, that of Genoa. Cicognara has carefully compiled a history of sculpture; Romagnosi and Tamburini have written on jurisprudence; Brocchi and Breislak on geology and mineralogy.

ITALIAN MUSIC AND OPERA. The history of Italian music is so interwoven with the history of music itself that but a very brief résumé is alone necessary here. The fuller treatment is to be found in the article MUSIC.

Italian music proper, omitting antiquarian researches, begins with the Flemish masters of counterpoint, who under Dufay took service in the pope's chapel at Rome, bringing with them the first masses in written counterpoint seen in the south of Europe. This was at the close of the fourteenth century. In 1502 Ottavio Petrucci invented and set up the first musical printing press at Venice. Hence a prodigious quantity of music was sent forth, a large proportion of it being by Flemish composers in Italy. The contrapuntal style was soon taken up, however, by the Italians. Festa (died 1543) created the madrigal; the Animuccia brothers created the oratorio; Goudimel set up the first school of music at Rome in 1540. Among his pupils was Palestrina (1524–94), the type and glory of the contrapuntal period. His contemporaries were Nanino, Gabrieli of Venice, and Luca Marenzio, the madrigal writer of Lombardy.

Rise of Opera.—About 1580 several Florentine gentlemen set up the Florentine Academy for the better study of the Greek drama, and Vincenzo Galilei (father of the astronomer) wrote a monologue in what he supposed was the style adopted in chanting the choruses of the Greek tragedies. He was followed by Cavaliere with an entire drama and music. Finally in 1600 Peri and Caccini produced the opera of "Euridice" at the marriage festivities at Florence of Henri Quatre and Maria de' Medici. These attempts were eclipsed by the work of Claudio Monteverde (1568–1643) with his "Orfeo" and other operas.

Meanwhile oratorio, begun by the Animuccias, was being developed by Cavaliere, who produced "L'Anima ed il Corpo" at Rome in 1600. Then came the great Carissimi (1580–1673), who really created the finished style with his "Jephthah" and "Jonah." Other church composers of this time were Viadana, Allegri, and Frescobaldi.

School of Naples.—This was due to Alessandro Scarlatti, one of the greatest names in music (1659–1725); his son Domenico, and his grandson Giuseppe succeeded him. From this great school sprang Durante, Stradella, Jomelli, Leo, Pergolesi; and the Venetian Marcello and the Roman Corelli were contemporary. The latter was the founder of modern violin playing, and his sonatas are played to this day. Handel studied with both Corelli and Alessandro Stradella.

Italian music was now eclipsed by the German schools, yet Boccherini (1740–1806) produced noble works. Viotti elaborated violin "technique," and Clementi (1752–1822) began modern pianoforte playing of the "classical" type. He came to England and stayed so long that we may claim him as an Englishman. So also do our neighbours claim as a Frenchman the great Florentine Cherubini (1760–1842), consummate in many various styles. Gluck's rival, Piccini (1728–1800), Salicci, Cimarosa, Paisiello (favourite of Napoleon I.), were contemporaries of these greater men.

Italian Opera.—Setting aside Cherubini, the first of the fine series of Italian operatic composers is Spontini (1784–1851), whose "Vestral" is still admired. Rossini (1792–1868), Bellini (1802–35), Donizetti (1790–1848), and Verdi, born in 1811, form an unrivalled group in the lighter style of opera. In other branches of music Italy, while holding its own in general culture, has not produced any name of the highest rank in this century.

ITALIAN PAINTING AND SCULPTURE. In ancient Italy there was no independent school of painting. What remains is wall painting, either of the Greek or of the half Greek cities of the south, Pompeii, &c., or copies of the Greek, as at Rome. The mode used is like fresco at first sight, but it is not really fresco. It is distemper, i.e. water-colour mixed with white of egg or glue to bind the colours. Much finer are the ancient Roman mosaics, of which some very splendid remains have been found, chiefly at Pompeii. The early Christian paintings in the Catacombs at Rome, &c. are in true fresco, and of a style than the stiffly arranged Byzantine manner in which the later pictures are grouped and drawn. The mosaics of the sixth century of Cosmo and Damiano at Rome still retain the quiet majesty of the figures of Christ found in the Catacombs, but this is almost the last example before the stiff parallel rows of wooden saints afterwards adopted. There are also fine early illuminated MSS.; such as the famous Virgil of the Vatican of the fourth or fifth century, and the Book of Joshua, which, though itself of the seventh or eighth century, is believed to be a copy of an older work.

In the sixth century the corrupt Byzantine style, stiff, unreal, strained in symbolism, and archaic to pedantry, fell like a blinding veil upon Italy, and lay upon her eyes until the thirteenth. The Latin conquest of Constantinople in 1204 sent to Italy many painters whose style was execrable, but whose methods were perfect. The best of the pupils of these men were such as Giunta of Pisa, who painted in

the Lower Church of St. Francis at Assisi. The Franciscan movement demanded large churches, cheap, and with vast unencumbered space; they were therefore built of brick like huge naked barns. When wealthier men joined the movement the churches were already there, and the vast unbroken wall-spaces cried for decoration. As the power of the Franciscan preaching lay in their holy stories of saints, the painters naturally turned such stories to decorative use. Hence the splendid development of early Italian fresco. After Giunta of Pisa and Guido of Siena came the great Cimabue (1240-1312), who painted in the Upper Church of Assisi, on which the whole force of Franciscan art was expending itself. Cimabue threw off in a large measure the trammels of the Byzantine school. Contemporary with him, and yet freer in his line, was Duccio di Buoninsegna of Siena (1260-1320). Between these men a new school, aiming at the representation of nature, was founded. So magnificent was felt to be the revelation of the beauty that lay around in nature, that Cimabue's altar-piece for the Rucellai Chapel in St. Maria Novella in Florence was carried in full procession through the city to its destination.

Schools of Florence and Siena.—Cimabue at Florence developed a school of vigorous conception and rich composition; Duccio at Siena strove for warmth of feeling and graceful treatment of single figures. Cimabue's successor was the greater Giotto (1266-1337), whose frescos run all along the wall of the Upper Church at Assisi beneath those of Cimabue, and at Padua, Florence, and Naples as well, still exist in scarcely dimmed freshness of colour to charm us. To him we owe the only authentic portrait of his friend Dante. To him also we owe the peerless campanile at Florence. Giotto is clearly free of all trammels, and his hand it was which guided the bark of Italian painting from the shore. To arrive at such art in one short lifetime seems prodigious. Of all artists perhaps his influence has been the most permanent. Taddeo Gaddi (1300-67) was one of the best of Giotto's pupils, and Orcagna (1329-76) was one of the same school, though not a direct pupil. In Siena meanwhile Simone Memmi (1284-1344) and Lorenzetti were painting as well as the Giottoists at Florence. The grand frescos (good government and bad government) in the Palazzo Pubblico at Siena by the latter are one of the glories of the town, and were painted in 1337-39. In Umbria, Rome, and Venice also, disciples of the new school of freedom in art arose and made good their advance, though as yet not rivalling Florence, which continued to lead till about 1450. Siena, devastated by a pestilence in 1348, had to stop the cathedral works and give up rivalry with Florence.

Fifteenth Century.—Now began oil painting to rise into notice; landscape was studied for the first time; portraiture became a special branch of art; anatomy was cared for, and the principles of perspective were discovered. It was a period of advance by leaps and bounds along the new path so gloriously discovered.

Ghiberti the sculptor had a vast influence in Florence. Uccelli (1397-1475) and Piero della Francesca (1415-92) were his pupils, all happily known to us by fine works. But Masaccio (1401-29) outstripped them all. He was the pupil of Masolino (a pupil of a pupil of Giotto), and his frescos at the Carmine, Florence, are so superbly fine that Michelangelo used them as models for his own study. Indeed so did all the artists for a century after Masaccio. Contemporary with him were two monkish painters, a fellow student, Fra Angelico (1387-1445), whom everybody loves and reverences as the saintliest soul whose purity ever expressed itself on canvas, and a pupil, Fra Lippo Lippi (1412-69). It was Fra Lippo Lippi who taught Botticelli (1446-1510), the first of the great painters of the Sistine Chapel (1483), and a devoted friend and follower of the martyr Savonarola; and Fra Angelico taught

Gozzoli (1420-98). Ghirlandajo (1449-94) and Luca Signorelli (1441-1523) were also artists immortalized by working in the "Sistine;" and Verrocchio, Cosimo Roselli and his pupil Piero, called Piero di Cosimo (1462-1521), the friend of George Eliot's "Romola," must also be mentioned as of the highest excellence among the great Florentine schools. Roselli was also a Sistine painter. The only other one (we are speaking of the great pictures in fresco on the walls, not of the stupendous ceiling or altar-piece of Michelangelo), greater than all of them, was Pietro Vannucci "Perugino" (1446-1524), so called from his long residence in Perugia.

This brings us into another school, that of *Umbria*, whose aim was spiritual beauty. Umbria had always been a favourite resting-place of religious devotees, even of St. Francis himself, and their temperament was translated into painting by Niccolò Alunno di Liberatore, whose pupil was Perugino. Purity of colouring and knowledge of anatomy and perspective were brought almost to perfection by this wonderful "Perugian." His frescos in the Sistine are masterpieces of beauty and grace. If he lacks anything it is in variety and in energy. His greatest pupil was Raffaello (or Raphael), of whom we speak below. But he also taught the excellent artist Bernardino di Biagio, called Pinturicchio (1454-1513), who helped in the Sistine, and who painted the magnificent frescos of the library in Siena Cathedral; and Giovanni di Pietro, called the Spaniard (Lo Spagno), from his nationality (1470-1530), and the intensely earnest Francesco Raibolini of Bologna (1450-1517), called Francia. Of these Francia is by far the greatest (save only Raffaello), and indeed may be pronounced fully equal to Perugino. At this time also Matteo da Siena (1435-1500) at Siena; Antonio Solario (1382-1455), surnamed *Lo Zingaro* (the Gipsy), and some others at Naples; and the greatest painter of the extreme north of Italy, Andrea Mantegna (1431-1506), with his pupils Bono di Ferrara and Bonsignori, and some others at Padua, also flourished.

Various Venetian, Veronese, Ferrarese, and Milanese artists copied Mantegna; but his greatest influence was with the first. He was son-in-law of Jacopo Bellini of Venice (1464-1516), and brother-in-law therefore of Giovanni and Gentile Bellini (1427-1507). Before the Bellini, Antonello da Messina (1440-93) had introduced into Italy the improved method of oil-painting adopted by the Van Eycks of Flanders. Among the pupils of the Bellini were Giorgione and Titian, presently to be spoken of. Other excellent painters at Venice were Cima da Conegliano, Moccetto, Udine, Carpaccio, &c.

The Golden Age.—Probably except the age of Pericles in Greek sculpture, no such wonderful blaze of art ever irradiated any country as flooded Italy with its glory in the sixteenth century. The pre-Raffaellite masters, or *quattrocentisti*, of whom we have spoken, had brought the art to perfection, and Lionardo da Vinci, Michelangelo, Raffaello, Titian, Correggio, all at the same time, but in separate places, were now to realize the highest pictorial effects the world has ever known.

Lionardo da Vinci (1452-1519) was the head of the Milanese school, and was a pupil of Verrocchio. There is no one, however ignorant of art, who does not at least know his fresco of the "Last Supper;" but in his case, as in all the rest, the reader is referred to the special article for a proper consideration of his splendid merits, and this sketch has merely to point out his position in the history of the art. His most famous pupils and followers were Bernardo Luini (1470-1530), Marco d'Oggione, Gaudenzio Ferrari (1484-1549), and Giovanni Antonio Bazzi, called *Il Sodoma* (1473-1549).

At Florence Michelangelo Buonarroti (1475-1564) reigned supreme. [See MICHELANGELO.] His Sistine Chapel frescos are the sublimest conceptions of art. His

best pupils were Sebastiano Luciani, called del Piombo, Venusti, and Daniele Ricciarelli, called da Volterra. A pupil of Cosimo Roselli and an intimate friend of Savonarola and of Raffaele, named Baccio della Porta, and, as he was a monk, also called Fra Bartolommeo (1475-1517), gave added glory to Florence at this time. He abandoned art for the cloister at Savonarola's death (his portrait of the martyr is one of the portraits of the world); but Raffaele induced him to resume the brush. He taught the friar a better perspective, and the friar taught him in return his secrets of colour and the use of the jointed wooden figures (lay figures), for which artists are indebted to him. Later distinguished Florentines of the golden age are Andrea d'Agnolo, called del Sarto (1487-1531), a pupil of Piero di Cosimo, Franciabigio, Pontorno, a pupil of Del Sarto, and Bronzino, the great friend of that delightful gossip and painter Vasari (1512-74), whose "Lives of the most Excellent Painters, Sculptors, and Architects" have delighted generations of men.

Unquestionably the greatest of all painters is Raffaello Sanzio of Urbino (1483-1520), pupil of Perugino. He is three distinct men rolled into one. His pictures in the Umbrian manner of Perugino gave way to those in the Florentine style, and finally his grand Roman works crowned the art of the world with a new development. Like Lionardo and Michelangelo (and the earlier Giotto) he excelled alike in sculpture and architecture as well as painting. But space forbids more here. His greatest scholar was Giulio Romano (1498-1546); and Garofalo, as Benvenuto Tisio of Ferrara was called (1481-1559), was another of Raffaele's assistants in the superb Vatican frescoes.

In Lombardy, Antonio Allegri, called from his natal village Correggio (1494-1534), at first greatly influenced by Lionardo, afterwards struck out a very distinct manner for himself. In the play of light and shade and subtle combinations of colour perhaps he surpasses all others. No other painters of the highest merit save Parmigiano come from the school of Correggio.

In Venice the splendid art of the Bellini bore golden fruit. First the luminous glow of Giorgio Barbarelli, called Giorgione (1476-1511), whose works are now so few and so infinitely precious, and his friend Del Piombo; and then the greatest colourist and finest master of portraiture of all Italy, the unrivalled Tiziano Vecellio, usually called Titian (1477-1576). Other splendid artists of the gorgeous Venetian school are Palma Vecchio (1480-1528), Paris Bordone (1500-71), Pordenone, Moroni (1510-78), some of whose portraits in our National Gallery are second to none, not even to Titian himself; and Jacopo da Ponte, called Il Bassano (1510-92). Greater still are Jacopo Robusti (1518-94), called Tintoretto, whom many rank with his master Titian, and the magnificent Paolo Caliari, called from his birthplace Veronese (1528-88).

Great Masters of the Decline.—The school of the *Eclectics* at Bologna, those who aspired to select the greatest beauty from each of the five great schools, was founded by Lodovico Carracci (1555-1619) and his cousins, Agostino and Annibale. Their greatest pupils, both men of wonderful genius, were the famous "Domenichino" (Domenico Zampieri, 1581-1641) and Guido Reni (1575-1642). The "Communion of St. Jerome" (Vatican) of the first and the ceiling-fresco "Aurora" (Rospigliosi Palace) of the second are among the finest works of art in the world. Albani, Guercino, Sassoferrato, and the graceful Carlo Dolce were also followers of this school.

On the other hand, the *Naturalistic* school was headed by the fine painters (all of them more or less tricky and forced in their work) Caravaggio (1569-1609), Ribera, a Spaniard (1588-1666), who lived long at Naples, where he met with Salvator Rosa (1615-1673), great at battle and brigand pieces. The best artist of the decline in Venice

is the faithfully realistic architectural painter Antonio Canaletto (1697-1768). The figures in Canaletto's work are often due to Tiepolo (1693-1778). Canaletto was imitated, at a respectful distance, by Francesco Guardi (1712-93). The National Gallery is very rich in both Canaletto and Guardi. Indeed that collection, though it possesses few of the very greatest pictures of the world, is perhaps more generally representative than any other; and practically all the names mentioned in this long list (together with many more perforce omitted) receive fair illustration there.

ITALIAN SCULPTURE.—At the revival or renaissance of art in Italy in the thirteenth century, when many Greeks came to Italy on the foundation of the Latin Empire of the East in 1204, their methods were studied by none so keenly as by Niccolò the Pisan. Method once grasped, his genius struck out a style of its own of intense originality, and the architectural and sculptural glories of Pisa, Orvieto, Siena, &c., are in great part due to him and his son Giovanni Pisano. The famous marble pulpit of Pisa Baptistery, with its superb bas-reliefs, was carved by Niccolò in 1260. Agostino and Agnolo of Siena, Andrea and Giovanni Pisano, and Orcagna of Pisa continued this fine tradition. The grandest work of Andrea Pisano is the bronze door, panelled in bas-relief, of the Baptistery at Florence (the southern gate), by many held to be the finest of the three famous "gates of paradise." Orcagna's greatest work in sculpture is the unrivalled high altar and baldacchino at Or San Michele, a church of Florence, probably the finest piece of decorative sculpture in the world. The names of the artists who designed the splendid tombs of the Scaligers, or family Della Scala at Verona, have unhappily been lost.

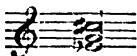
In the fifteenth century there are a few fine works (too few remaining) of Jacopo della Quercia of Siena (1371-1438), such as the tomb of Carretto at Lucca and the famous fountain at Siena. And then we come to the superb bas-reliefs on the other two gates of the Florence Baptistery, by Lorenzo Ghiberti (1378-1454), the western gates being those which especially called forth the enthusiastic encomiums from Michelangelo that they were fit to be the gates of paradise. Brunellesco (1377-1446), architect of the dome of Florence Cathedral, was also great at sculpture. Still greater was Donatello (1386-1466). A wonderfully fine series of medallions and bas-reliefs in glazed terra-cotta, as fresh to this day as when they were first finished, is due to Luca della Robbia (1400-82). It seems a thousand pities that more work has not been done in this imperishable material, when one contrasts the sharpness of Luca's beautiful figures with the dilapidations suffered by the great creations in marble. Chief of the followers of Donatello was Andrea Verocchio (1432-88), whose splendid equestrian bronze statue of Coleoni in Venice is known to all, and whose great influence in the sister art of painting has been spoken of above. Mino da Fiesole flourished also at this period in Central Italy, Lombardo, father and son, and Leopardo (1480-1540) at Venice. The splendid front of the Certosa at Pavia, which always seems too rich to be exposed to the weather, was begun in 1473, some of the sculptures being attributed to Busti.

In the sixteenth century we ought to have a wonderful statue (equestrian) by Lionardo, spoken of as the wonder of the time, but it was never cast, and the model was destroyed by the French in 1499. He was, we are told, as great in sculpture as in painting. Michelangelo, however, is not only the greatest sculptor of the century, but of all times, except only the highest Greek art. To name his "David," his "Moses," and his "Pietà" is sufficient to bear this out. Very little sculpture is left from Raffaele's hand beyond bas-reliefs in plaster, but everything we have is exquisite. Sansovino's bas-reliefs (1460-1529) and those of his pupil Tatti in Venice (1479-1570) are also very famous works. Benvenuto Cellini (1500-71) at Florence, though famous

rather for his unrivalled gold and silver works, has also left some fine sculpture, especially the "Perseus and Medusa," whose delicate bronze has braved all weathers so many centuries in the great square at Florence. Later artists, but of less eminence, are Giovanni da Bologna (1524-1608) and Stefano Maderno (1571-1636). The "Mercury" of the first (Uffizi Gallery, Florence) is a masterpiece of delicate poising—the figure's foot hardly touches the curve on which it rests.

Great Masters of the Decline.—The first of these is Bernini (1598-1680), whose impious desecrations of antique masterpieces are the despair of lovers of art; his "Ass's Ears," the two absurd towers which used to deface the Pantheon at Rome, are a sufficient justification for the remark. The rest are not worth notice here. But Antonio Canova (1757-1822), though coming late, has redeemed modern Italian sculpture. In the Vatican his best works stand side by side with those of the ancient Greeks, and that without the fall being at all ridiculous. Greater praise could not be attained save by Michelangelo himself. Thorwaldsen (1770-1844), a Dane, and Richard Gibson (1791-1866), an Englishman, were sculptors who studied under Canova, and whose long residence in Rome may entitle them to be included at the close of this list.

ITALIAN SIXTH, THE CHORD OF THE, is one variety of the AUGMENTED SIXTH.



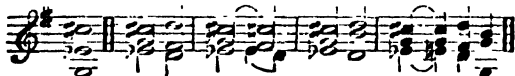
Italian Sixth, Key of G.

Its usual form is when the notes of the Augmented Sixth carry between them the Major Third to the bass. Or, to express it accurately, it is when the Third and Seventh of the supertonic (A is the supertonic of G, and C# and G are the Third and Seventh of A) are added to the Minor Ninth of the dominant (D is the dominant of G, and E# is the Minor Ninth of D). In the example above the chord rests on the roots A and D, the supertonic and dominant of the key of G. The reason of its being called the Italian Sixth is not known.

The two notes which form the augmented Sixth are most rarely inverted as a diminished third. The only inversion in general use is therefore that shown below. The most usual resolutions of the chord are also given below.

Inversion of It. Sixth.

Resolutions of Italian Sixth.



On Dominant. On Minor Ninth. On Tonic. On Supertonic.

ITALIC VERSION OF THE BIBLE is the name given to the old Latin translation from the Septuagint (Greek) which was in use in the Latin Church in the early centuries. St. Jerome completed it and revised it, for it was both imperfect and incorrect, and was the work of several hands. This took him from 383 to 404. But at the same time he undertook that splendid fresh translation of his own which of itself serves to immortalize him, the famous *Vulgate*, which became to Latin Christianity of equal authority with the Hebrew and Greek originals from which it was translated.

ITALICS. This well-known variety of printed characters was first invented and used by the celebrated Aldo Minuzio (*Aldus Minutius*) in printing Virgil in the Aldine classics at Venice in 1501. The type was cast at Bologna. Minuzio called it *Corsivi*, but it quickly got the name of *Italic* (or Italian) type. It is found inconvenient to read when in large masses, but its highly distinctive character renders it invaluable in emphasizing words or phrases, and setting them apart from the general text. Indeed, so thoroughly is this the function of italic type that to italicize is frequently used as synonymous with emphasize.

ITALY (Lat. and Ital. *Italia*; Fr. *Italie*; Ger. *Italien*), one of the most fertile and extensive countries in the south of Europe. Though formerly separated into numerous subdivisions, it is evidently marked out by nature for one great whole. It consists partly of islands and partly of mainland. The continental portion extends from 47° to 37° N. lat., and from 7° 21' to 18° 30' E. lon. On the W. and S. its shores are washed by the Mediterranean; on the E. it is bounded by the Adriatic; on the N., N.E., and N.W. the lofty chain of the Alps, including the Pennine, Rhætian, and Carnic systems, distinctly separate it from the rest of Europe. Towards the N.E., however, its boundary is more exactly defined by the River Isonzo, which, rising in the Carnic Alps, flows onward to the Gulf of Trieste, at the head of the Adriatic. Its extreme length, as thus developed, is about 718 miles; its breadth in the north, where it is greatest, 340 miles; but it so rapidly diminishes towards the south, that while in the centre it is only 150 miles wide, at its narrowest southern point it does not exceed 15 miles.

The whole of Italy is now united into one kingdom under the rule of a constitutional sovereign; but previous to 1859 it consisted of several independent states, whose names it seems desirable to preserve for the convenience of reference. These divisions were—(1) Austrian Italy or Lombardo-Venetian kingdom, including Lombardy and Venetia; (2) kingdom of Sardinia, including Piedmont, Sardinia, and Savoy, the latter now belonging to France, being together with Nice the price which Italy paid for the assistance rendered by the Emperor Napoleon in her struggle with Austria in 1859; (3) kingdom of Naples and Sicily; (4) the Papal States; (5) grand-duchy of Tuscany, including Lucca; (6) duchy of Parma; (7) duchy of Modena; (8) republic of San Marino; and (9) principality of Monaco.

Physical Features.—The form of the Italian peninsula is compared to that of a boot. The broadest or northern portion forms the top, the central portion the leg, and the southern the foot, the toe and heel respectively the capes of Spartivento and Di Leuca; and between these two notable headlands lies the Gulf of Taranto (anciently *Tarentum*). Cape Nau or Colonne projects on the western side of the entrance to the Tarentine Gulf. Cape Gargano, on the promontory of Sant' Angelo, is thrown out into the waters of the Adriatic, on the eastern side of the peninsula; while on the western coast project the capes of Palinuro, Campanello, Circello, Monte Argentaro, and many others, famed in song, legend, and history.

Numerous islands stud the Italian seas. Of these the largest are—Corsica (belonging to France), celebrated for its romantic scenery and the ardent spirit of its inhabitants, no less than for the birth of the great Napoleon; Sardinia, the natural resources of which are considerable, and have only been imperfectly developed; and Sicily, one of the fairest and richest of the isles of Europe. Less important are the Lipari Islands, north of Sicily; Malta and Gozo, belonging to England, midway between Gibraltar and the peninsula; Elba, once celebrated for its iron mines; and various groups of islets in the Adriatic.

In the north and south Italy is a mountainous country; in the centre it spreads into vast levels, and an extensive plain also lies between the Adriatic, the Alps, and the Northern Apennines. The Apennines divide Italy into two distinct regions: one, lying to the north, is the plain already spoken of, and chiefly occupied by the basin of the Po and its numerous affluents; the other, which is the real peninsula, stretches in a south-eastern direction for above 500 miles. The Apennines and their lower ranges form the backbone of this peninsula, extending its whole length, and terminating on the coast of the Strait of Messina. On each side lies a narrow belt of level ground, watered on the west by some important rivers—the Arno, the Tiber, the Garigliano, and the Volturno.

The area and population of the present kingdom of Italy are as follows:—

Provinces.	Area: Eng. sq. miles.	Population in 1881.
Alessandria,	1,932	729,710
Ancona,	736	267,338
Aquila (Abruzzo Ulteriore II.), . .	2,509	353,027
Arezzo,	1,278	238,744
Ascoli Piceno,	809	209,185
Avellino (Principato Ulteriore), . .	1,409	392,619
Bari (Terra di Bari),	2,292	679,499
Belluno,	1,271	174,140
Benevento,	688	238,425
Bergamo,	1,088	390,775
Bologna,	1,391	457,474
Brescia,	1,644	471,568
Cagliari,	5,257	420,635
Caltanissetta,	1,455	266,379
Campobasso (Molise),	1,771	365,034
Caserta (Terra di Lavoro),	2,313	714,131
Catania,	1,970	563,457
Catanzaro (Calabria Ulteriore II.), .	2,307	433,975
Chieti (Abruzzo Citeriore),	1,105	313,948
Como,	1,050	515,050
Cosenza (Calabria Citeriore), . . .	2,841	451,185
Cremona,	632	302,138
Cuneo,	2,799	635,400
Ferrara,	1,010	230,807
Firenze,	2,268	790,776
Foggia (Capitanata),	2,956	356,267
Forlì,	719	251,110
Genova,	1,572	760,122
Girgenti,	1,491	312,487
Grosseto,	1,707	114,295
Lecco (Terra d'Otranto),	3,293	553,298
Livorno (including Elba),	126	121,612
Lucca,	576	284,484
Macerata,	1,057	239,713
Mantua,	961	295,728
Massa Carrara,	687	169,469
Messina,	1,768	460,924
Milano,	1,155	1,114,991
Modena,	966	279,254
Napoli,	412	1,001,245
Novara,	2,533	675,926
Padova,	755	397,762
Palermo,	1,964	699,151
Parma,	1,251	267,306
Pavia,	1,284	469,831
Perugia,	3,719	572,060
Pesaro Urbino,	1,144	223,043
Pisa,	1,180	283,563
Piacenza,	965	226,717
Porto Maurizio,	467	132,251
Potenza,	4,122	524,904
Ravenna,	742	225,764
Reggio Calabria (Calabria Ult. I.), .	1,515	372,723
Reggio Emilia,	877	244,959
Roma (Latia),	4,601	903,472
Rovigo,	651	217,700
Salerno (Principato Citeriore), . .	2,126	550,157
Sassari,	4,142	261,367
Siena,	1,465	205,926
Siracusa,	1,427	341,526
Sondrio,	1,261	120,534
Teramo (Abruzzo Ulteriore I.), . .	1,284	254,806
Trapani,	1,214	283,977
Treviso,	941	375,704
Torino,	4,068	1,029,214
Udine,	2,515	501,745

Provinces.	Area: Eng. sq. miles.	Population in 1881.
Venezia,	849	356,708
Verona,	1,061	394,065
Vicenza,	1,016	396,349
Total,	114,296	28,459,628

General View of the Surface.—It will assist the reader to form a correct conception of the features of the country if he supposes himself placed in a balloon at a moderate height, and proceeding slowly from north to south. At the outset of his aerial journey he will see beneath him the huge bulk and snowy pinnacles of the great Alpine chains, spreading in a vast semicircle of rock, avalanche, and glacier from the head of the Gulf of Trieste, on the east, to the extremity of the Gulf of Genoa on the west. These chains include the Carnic Alps, north of Venetia; the Rhaetian Alps, north of Lombardy; the Lepontine and the Pennine Alps, to the north; the Graian, Cottian, and Maritime Alps, to the west of Piedmont. Their crests rise above the limit of perpetual snow, and their flanks exhibit every charm of scenery and every variety of vegetation. Formidable as such a barrier appears, it cannot daunt the enterprise of man, for in addition to several passes over it, a tunnel through it—forming a marvellous triumph of engineering skill—was opened in 1870; and another, under Mont St. Gotthard, in 1883.

Now before the aeronaut spreads the vast plain of Lombardy, with a gradual slope towards the head of the Adriatic, and overspread by a network of fertilizing waters—the Po and its numerous tributary streams. The lower part of the plain is almost a perfect level, smiling with crops and vineyards, rich in luxuriant pastures and mulberry groves, which are largely cultivated for the sake of the silkworm—the most fertile and populous portion of the Italian peninsula. The mountain-chains which encircle it sweep upwards with a steep acclivity, and embosom among their spurs numerous fair and tranquil valleys. Here are situated the beautiful Italian lakes, Garda, Como, Orta, Lugano, and Maggiore, each distinguished by a peculiar loveliness of its own.

To the west lies Piedmont (i.e., at the foot of the mountain, Ital. *Piedimonte*, from *piede di monte*), a finely varied and fertile plain, intersected by the Po, which rises in Monte Viso, and traverses it from west to east, throwing off numerous arms, to the great facility of intercommunication and the infinite advantage of the agriculturist.

Keeping along the western side of the pine-clad Apennines, we find an extensive undulated district stretching along the shores of the Mediterranean for nearly 200 miles, from Pisa to the ancient stronghold of Terracina, and varying in breadth from 10 to upwards of 30 miles. The Tuscan portion of this unpleasant tract is known as the *Maremma*, and is unfavourably celebrated for the pestilence which, from April to October, broods over its swamps and valleys. The whole region is, however, more or less subject to malaria for a considerable portion of the year. Along the borders of the Apennines exist very different conditions. The scenery is full of nooks and corners which charm the artist, the population is industrious, the earth offers abundant treasures of marble and copper, and the olive is extensively cultivated.

In the neighbourhood of Rome the coast district forms the well-known Campagna di Roma, the greater portion of which is blighted with malaria, and hence has been abandoned by man as well as neglected by nature. It is equally bare of trees and human habitations. Adjoining its south-eastern extremity spread the Pontine Marshes, which extend for 22 miles along the coast and from 6 to 12 miles inland,

Dry pasture-lands intermingle with the marshy surface. A rank vegetation is luxuriantly produced; and hence malaria prevails, which renders even travelling through the fever-haunted region unsafe, except in the winter season. There are a few fixed inhabitants, whose appearance, comparable at the best to that of convalescents in the grounds of an hospital, betrays the insalubrity of the site. But as soon as the fierce heat is over, and the fresh autumn breezes begin to blow, removing the scourge, the peasantry from the Alban Hills and other bordering heights come down to the low grounds with their flocks to pasture them till May renews the danger, lodging in temporary huts of straw and reeds. This district has been stamped with its fatal peculiarity in consequence of ages of neglect, for in ancient times it was thickly studded with Etruscan and Volscian towns. Ruins of aqueducts, arches of demolished buildings, broken fountains, and masses of rubbish are scattered in every direction, the monuments of bygone life, where now the sounds and signs of human industry are few and far between.

Further to the southward we pass into a sunlit land—the Neapolitan provinces, rich in the choicest gifts of nature, where, with little labour, the bountiful soil abundantly yields the grape, the olive, Indian corn, and every variety of vegetables and fruit. Scarcely a spot which does not present some picturesque and romantic landscape; scarcely a spot, it may be added, which is not hallowed by some classical or legendary association. Here, too, rise numerous volcanic peaks, and, conspicuous among all, towers the famous Vesuvius, raising its crest of fire above the beautiful Bay of Naples and the sites of the ruined cities of Pompeii and Herculaneum. With Sicily, the south-western portions form the earthquake region of Italy, which have been frequently devastated by shocks of appalling violence.

Traversing now the eastern side of the Apennines, a considerable plain—the Capitanata, or Terra di Puglia—stretches from the neighbourhood of Otranto to the bold bluff promontory of San Angelo. Its southern part is dry, barren, and generally treeless; northward it improves in character, and furnishes some extensive pastures.

Still further north we come to the old historic city of Ravenna, surrounded by ancient woodland, which Byron, Boccaccio, and Dante have celebrated in immortal song. Of old it supplied the Romans, and at a later time the Venetians, with timber for their fleets. The forest extends about 28 miles along the shore, and inland from 1 to 3 miles.

"Various the trees and passing foliage there,
Wild pear, and oak, and dusky juniper,
With briery between in trails of white,
And ivy, with the suckle's streaky light;
And still the pine, long-haired, and dark, and tall,
In lordly right predominant o'er all."

Byron, who spent two years at Ravenna, has referred to the changes which this part of the Italian coast has undergone since the prehistoric age:—

"Sweet hour of twilight! In the solitude
Of the pine forest and the silent shore,
Which bounds Ravenna's immemorial wood,
Rooted where once the Adrian wave flow'd o'er,
To where the last Cæsar's fortress stood—
Evergreen forest!"

But our imaginary aerial voyage terminates at Venice, "a glorious city in the sea," situated on a number of islands that lie in the midst of extensive lagoons, and are connected by many bridges. The Venetian territory lies between Tyrol and the Adriatic, and is separated from the other Italian provinces by the lower course of the Po and the stream of the Mincio, one of its principal affluents. The surface is finely contrasted; fertile plains, clustering groves, beautiful vales, and Alpine spurs combining to form a

richly attractive picture. Besides the Mincio and the Po it is watered by the Adige, the Brenta, the Piave, and the Tagliamento, which are linked together by an admirable system of canals. The whole of the maritime region and a portion of the interior constituted the celebrated republic of VENICE, which was founded in the fifth century by the fugitives driven to the littoral marshes by the furious irruptions of Attila.

Hydrography.—The principal Italian rivers are the Po, the Adige, the Arno, and the Tiber. Of these the only one important in volume or extent is the Po—the classic *Eridanus*—which is capable of navigation throughout its whole course, though subject to frequent changes in the rapidity of its current, when its numerous tributaries are swollen by violent rains or the melting of the mountain snow. The father or king of rivers, as the Italians proudly call it, rises in Monte Viso, one of the Cottian Alps, and flows rapidly eastward, as a mountain torrent, until it develops at Lombriasco into a majestic stream. Turning to the north it passes Turin, and taking an easterly direction reaches the borders of Lombardy, and receives the Ticino. It then gladdens Piacenza and Cremona with its waters, forms the old frontier of the so-called Papal States, throws off several branches, and finally, dividing into two principal arms, the Po-di-Maestro and the Po-di-Goro, enters the Adriatic by two mouths, about 12 miles distant from each other. Its direct course is 270 miles, or including windings about 450 miles. The river has a powerful current, subject to sudden and frequent changes, which interfere with its navigation. It brings down large quantities of sand and mud, which, by deposition, have formed an extensive delta and very sensibly advanced the coast-line on both sides of its mouth during the historic period. In the age of Augustus the town of Adria, from which the Adriatic has its name, was a seaport and a station for the Roman fleet, but is now 15 miles from the nearest point of the shore; and the city of Ravenna, which was once maritime, is now a few miles inland. The sediment has also contributed to raise the bed of the river in the lower part of its course considerably above the level of the surrounding country, so that in the plain of Ferrara the surface of the water is 35 feet higher than the streets of the town, which are preserved from inundation by huge artificial embankments. The same is the case with the Adige, the Ticino, and indeed with all the principal river streams of Lombardo-Venetia.

The Tiber (in Lat. *Tiberis*; in Ital. *Terere*) rises in the Apennines, in the province of Florence; flows first south, then south-south-east; crosses the ex-Papal States; traverses immortal Rome, with whose glories it is inseparably associated; flows south-west, and separating into two branches, the Fiumano and the Fiumara, falls into the Tyrrhene Sea by two mouths: its length is about 240 miles. Its waters are always loaded with a yellowish mud, whence Horace terms it "flavus Tiber," the tawny Tiber. The Adige (ancient *Atkeis* or *Atisius*) rises in the Rætian Alps, about 46° 30' N. lat., and, after a sinuous course of about 180 miles, chiefly south and west, falls into the Adriatic at 45° 10' N. lat., and 12° 20' E. lon., entering the sea with the Po by a delta common to both. Its principal affluents are the Eisack, the Novi, and the Avisio. The Arno (ancient *Arnus*) is a Tuscan river, and has several affluents. Its sources lie in Monte Fallerina, among the Apennines. Its general direction is westward. After passing through Florence it becomes navigable, and about 7 miles below Pisa falls into the Mediterranean, after a course of about 155 miles.

The largest lakes are those of Maggiore, Como, and Garda. The Lago Maggiore, or Verbano, in Tessin, Piedmont, and Lombardy, is about 40 miles long, with a maximum breadth of 5½ miles and a mean breadth of 2 miles. Its depth is 2625 feet, and its height above the sea-level

638 feet. It is surrounded by landscapes of exquisite beauty, in which the Alpine heights form a notable feature. But far lovelier, richer, and more varied is the Lake of Como, which lies at the base of the Lepontine and Rætian Alps, 700 feet above sea-level. It is mainly formed by the river Adda, and is divided into three basins by projecting spurs of land. It is altogether about 15 miles in length, and its general breadth does not exceed 2 miles. Throughout its whole extent the banks are formed of steep and well-wooded mountains, 3000 to 4000 feet in height. The Lago di Garda (or Benaco) is another beautiful expanse of inland water, 33 miles long, and 3 to 11 broad, and 213 feet above the sea-level. It receives the Sarca, and is drained by the Mincio, which issues from its south-eastern extremity, near the stronghold of Peschiera. It teems with fish. Its greatest depth is 902 feet. In Southern Italy lie some lakes, or rather lakelets, of less extent, but generally of infinite loveliness, such as the Lago di Albano and the Lago di Nemi.

Mountains.—These are divided into two great systems—the Alpine and the Apennine. The former may more properly be considered under the head of SWITZERLAND, though some of the principal peaks look down upon the fair Italian plains. The Apennines run down the whole length of the peninsula, and though attaining no very remarkable elevation, are so broken in outline and so richly wooded as to present some most delightful and romantic points of scenery. Their chain chiefly consists of limestone, which furnishes admirable building materials, and also marble of excellent quality, the pure white Carrara marble being especially prized by sculptors. Granite occurs in Calabria, at the southern extremity of the range.

Italy is distinguished from the rest of the Continent by a volcanic zone on its south-western side, which includes three active summits—Vesuvius on the mainland, Etna in Sicily, and Stromboli in the Lipari Islands; the last of which has never been known to extinguish its torch, and is the great lighthouse of the adjoining Mediterranean. The activity of Etna has been noted the longest. Its earliest recorded eruption took place under Hiero, in the second year of the seventy-fifth Olympiad, or 476 B.C., and is mentioned in the "Prometheus" of Æschylus and the first Pythian ode of Pindar. It reposed for several centuries in the middle ages, but has been in frequent and violent action in more modern times. On the last occasion, in 1868, vast torrents of lava were ejected, one of which was 2 miles broad, with immense clouds of ash-gray dust, which covered the whole of the surrounding country. Vesuvius was not known to be active before the year 79 A.D., when the cities of Herculaneum and Pompeii were overwhelmed by its products, and only discovered in the first half of the last century. From that period to the year 1188 eight eruptions are recorded; none occurred afterwards till 1306; a pause followed of more than three centuries with but one slight outbreak; but since 1666 the volcano has only been at rest for very brief intervals. Dormant craters are numerous in connection with the lower slope of the Apennines as far north as Tuscany, several of which are now occupied by small lakes. The Romans obtained their cement from the pozzuolana or volcanic earth of their neighbourhood. In excavating for it, as well as for materials to enlarge and beautify the city, the subterranean galleries were formed which afterwards served as places of refuge for the early Christians during the persecutions, and were also used for the burial of their dead. Violent earthquakes occasionally disturb the southern region, and would doubtless be more frequent and severe but for the volcanic vents.

Geology.—The geological structure of Italy is necessarily connected with the comparative fertility of its various portions. The volcanic formations, by the decomposition of their lavas, yield soils of amazing fertility; but in the

immediate vicinity of the Alps and the Apennines, where granite and primitive rocks abound, the country is generally barren, and tasks all the science and industry of the agriculturist in its improvement. The sedimentary rocks are of recent date. At the bottom lies the Jura limestone, stretching from the frontiers of Tuscany into the Neapolitan provinces, while in Lombardy it extends from Lago Maggiore to the coast of the Adriatic. Chalk, which lies upon the limestone, stretches in a narrow band along the western shore, from the Gulf of Genoa to the glittering headland of Capo Santa Maria di Leuca. Above this accumulate the tertiary sandstones, travertin, and marl, chiefly on the east coast, but also developed largely in Tuscany and Piedmont. And finally, the upper crust, which continually increases, consists of alluvial and diluvial deposits, occupying the greater part of the basin of the Po.

Climate.—Generally speaking the Italian climate is warm and dry, but it is necessarily affected by differences of elevation and position with regard to the mountains and seas. While in Naples and Sicily ice and snow are unknown, except on the lofty brow of Etna, north of the Apennines snow falls in winter, and the broad lagoons at the mouths of the rivers freeze. In Central Italy the olive, orange, and lemon flourish luxuriantly, and throughout the year the ground is mantled with verdure. In the southern provinces a tropical vegetation covers the low warm plains, such as the sugar-cane, the papyrus, the Indian fig, and the date-palm. In summer the heat is intense, and the fell breath of the sirocco frequently scorches the earth. The rains fall with great violence at particular seasons; but on the whole the atmosphere is wonderfully transparent, and the sky of that glowing and intense azure which has become proverbial. From morn till eve it often remains without a cloud; darkly, deeply, beautifully blue, except when the glories of the sunset enrich it with a thousand combinations of colour, like flashes of rare jewelry—emerald, and topaz, and ruby—all fading softly and slowly into the "clear obscure" of night.

Natural Products.—The mineral wealth of the peninsula is extensive and varied. Tuscany possesses rich mines of lead, copper, quicksilver, cinnabar, and sulphur; and the mines of Elba export large quantities of iron ore daily. Boracic acid is supplied from the Tuscan mines to most of the European manufacturers. Its existence was first discovered in 1777, and it is now largely substituted for the borax of India. It is procured from the lagoons of Montecerboli, which consist of a countless number of small volcanoes and springs constantly in violent action; the ground, which quakes and glows beneath the feet, is covered with crystallizations of sulphur and other minerals. The alum pits of Tuscany afford an unfailling supply. In Southern Italy and Sicily occur extensive beds of sulphur; and Sicily exports nearly all that is consumed in Europe, producing as much as 70,000 tons annually. The saltens and brine springs in the marshes afford large quantities of salt. Limestone, marble, alum, alabaster, lava, nitre, granite, are among the treasures which Italy derives from her mountain masses. The plains and lower slopes of the hills bloom with the mulberry, the vine, the olive, the myrtle, the laurel, and numerous fruits and evergreens. At a greater altitude wave extensive woods of chestnut, oak, beech, pine, and the silver fir; the latter a tree highly valued by the ancients, and immortalized by Virgil—

"Hills clad with fir, to guard the hallowed bound,
Rise in the majesty of darkness round."

The vine is of universal cultivation. The plants begin to bear fruit in the third year, and the vintage commences at the end of September. Figs, almonds, and cucumbers thrive in the south, as well as tobacco and cotton. Rice is grown in the marshy districts, and the liquorice root in the Calabrias. The best olives are those which flourish at

Venapo, and are locally known as the *Sergia*; the oil which they yield is famous for its sweetness and purity.

Agriculture.—According to the latest returns more than 8,000,000 of the population are employed in agricultural pursuits. Of this number nearly 1,500,000 are small proprietors who cultivate their own land, nearly half of them belonging to Piedmont and Liguria. The extent of land cultivated by them is in general so small that, although care is bestowed upon it, the occupiers are obliged to work elsewhere in order to support their families. Nearly another 1,500,000 are "mezzadri," or occupiers who take about half the produce of the soil, the rest belonging to the landlord. These are most numerous in Lombardy, Romagna, the Marches, and Tuscany.

In order to assist poor proprietors and farmers land-credit institutions have been formed in the last few years, which lend money for short periods on land-credit bonds or agricultural produce. In the southern provinces corn hanks, or stores of grain from which seed corn is advanced to small farmers, have been established since the fifteenth century. The condition of the agricultural labourers is even worse than in England, and in consequence of the low rate of wages emigration is rapidly increasing. Agriculture is generally in a backward state, which is attributed chiefly to the prevalence of small holdings and the ignorance of the occupiers, who are opposed to all change. A very important branch of industry is the culture of the mulberry tree for raising silkworms; and the silk exported from the Lombardo-Venetian provinces alone produces an annual revenue of £3,300,000. About 2,000,000 lbs. of cotton are grown in Southern Italy and Sicily every year. The corn crops are extensive, and afford an excellent grain.

Italy possesses at the present time 3,500,000 cows or oxen, 1,000,000 horses, mules, and asses, upwards of 40,000,000 goats, and 3,000,000 pigs. The country is steadily growing in agricultural and pastoral wealth, and well-directed enterprise in these respects is so richly rewarded as to encourage general imitation. Italian natural history differs but little from that of the rest of southern Europe, except that it includes among insects the asp, scorpion, and tarantula. There are 250 species of birds in Central Italy alone. Among the wild animals found in the forests may be named the wolf, the lynx, the stag, the marmot, the badger, and the wild boar. Foxes and hares abound, and in the south of Italy the crested porcupine. The rivers and lakes abound in fish, and on the coast are numerous important fisheries, especially the tunny, anchovy, and sardine. Tuscany yields several kinds of wine of a superior quality, which the poet Redi celebrated in his glowing dithyrambic of "*Bacco in Toscana*." That of Montepulciano he styles the "king of all wines," *d'ogni vino è il re*; it is known commercially as the Aleatico, or red muscadine, has a brilliant purple colour, and a delicious keenly aromatic flavour.

Army and Navy.—The present organization of the Italian army was decreed by laws passed in June, 1882, and July, 1883, as amendments of the law of 1873. On the 1st January, 1885, the total number of soldiers on the permanent army was set down at 750,765; the numbers in the Mobile Militia, or first class of the Reserve, were 341,250, and those of the Territorial Militia 1,021,954—which made a grand total of 2,113,969 soldiers. The Italian army, like most of the continental armies, is raised by annual conscription among young men having completed their twentieth year, but those who wish to finish their term of service early may volunteer for three years at the age of eighteen. The draft for 1885 was fixed at 80,000 men. Young men who are not wanted for the regular draft serve six months with the colours, and then enter the Mobile Militia. The actual strength of the standing army at the beginning of 1885 was—line infantry soldiers of more than two years' training and efficient for any service,

246,804; line infantry incompletely trained, 262,626; Alpine battalions, 19,897; Bersaglieri, 41,850; cavalry, 36,726; artillery, 76,191; engineers, 18,288; carabinieri, 20,859. This force is commanded by 12,914 officers, and there is a complementary list of 2989 officers, who, though retired, would return immediately to duty in case of war. In addition, 2016 officers hold commissions in the Mobile Militia and 5281 in the Reserve. The Alpine troops form a speciality in the Italian army. Possessing a strictly territorial organization, and with service companies always kept at war strength, they are believed to be able to put 30,000 men into line at the outbreak of war. Born mountaineers, well acquainted with every pass, hardy, physically strong, and deadly marksmen, they would offer an effective resistance to any enemy who sought to invade the country in this direction. Other parts of the continental frontier are defended by fortifications distributed according to a plan decided on in 1874, and at present in process of execution.

Since 1877 the Italian navy has been rapidly developed in accordance with a definite programme then laid down, and it now comprises some vessels which are more powerfully armed and better defended than any others in the world, not excepting the best ships of the British navy. Of these the *Duilio* and *Dandolo*, now in commission, carry each four 100-ton muzzle-loading Armstrong guns in two turrets, defended by armour 17½ inches thick, the thickness of the armour of the citadel at the water line being 22 inches. The *Italia* and the *Lepanto*, launched in 1884, are the largest warships yet constructed. They are 400 feet long, 72½ feet broad, and are to have an extreme draught of water exceeding 30 feet. Of 13,700 tons displacement, they are to be furnished with engines of 18,000 horse-power, and it is expected that they will have a speed of 18 knots. Their armament consists of four 100-ton breech-loading guns, carried in a barbette battery protected by 19 inches of steel-faced armour set obliquely, and eighteen 4-ton 6-inch breech-loading guns are to be mounted on the broadside. They have no vertical belt armour, but they have an armoured deck below the water line; the space above this is minutely subdivided, and thick vertical armour is used to protect the funnels, hatches, ventilators, communications with the magazines, barbette battery, &c. Their nominal cost is £800,000 each. The whole navy of Italy in 1885, including all vessels building as well as those afloat, was 112 vessels, classed as follows:—Fifteen ironclad vessels of the first class, carrying 100-ton guns; seven ironclads of the second class (four being torpedo rams), nine frigates and corvettes rated as second-class warships, fourteen corvettes of the third class, three first-class transports, thirteen second-class transports, eleven steam vessels for local use, besides eleven first-class torpedo boats and eighteen building, and eleven second-class torpedo boats. The recruitment of the navy is by means of conscription, but in time of war an indefinite number of men could be rapidly obtained by levying from the fishermen and merchant seamen whose names stand on the "Maritime Inscription." These men constitute a powerful naval reserve. The budget of the navy for the year 1884–85 showed an expenditure of £3,745,000; that of the army amounted to £10,375,000.

Revenue, Expenditure, and National Debt.—Previous to the unification of Italy, each petty state fenced itself round with custom-houses, and rigorously exacted duties, which in many cases were impolitic and oppressive, but nevertheless swelled the revenues of the several states. When the events occurred which resulted in the ultimate fusion of these various states into a single kingdom, a period of provisional government intervened, during which the custom-houses were thrown down, many of the duties were abolished, and the revenues disappeared. It was, however, by no means so easy to reduce expenses and abolish hosts of salaried func-

tionaries, of whom there were found to be the large swarm of 90,000, with hundreds of needless ecclesiastical and other institutions. Moreover, while the revenues of the deposed governments disappeared, the consolidated state had to take over and provide for their debts. The various revolutions, the war of 1859 and that of 1866, all added very materially indeed to the national debt. A powerful army and navy were considered indispensable; and in view of and subsequent to the events of 1870, as we have already mentioned, these forces were largely strengthened. Great additional expenditure was involved, also, by the reversal of the policy of former governments. Schools were opened in all directions; roads to connect the several parts of the country were begun, and railways on a great scale were planned and set on foot. And it is to be borne in mind, above all, that the misgovernment from which the country escaped had drained away its wealth, stunted its intelligence, and destroyed its industry. A considerable period had to elapse therefore, before the public wealth grew sufficiently to meet the enormously increased demands of the treasury.

In the case of a nation which enters upon a new existence under such circumstances, a certain degree of improvidence, and a certain disregard of the most strict rules of political economy, is scarcely to be wondered at. Experience had to be gained in fiscal reform and management, and it proved to be extremely costly. The national debt, which in 1860 was £37,480,000, had risen by 1885 to about £406,000,000, involving an annual expenditure for interest and sinking fund of £21,150,667. The revenue in the meantime rose from £18,760,000 in 1860 to about £62,500,000 in 1884-85, while the expenditure, which was such as to leave a deficit every year until 1877, has since then been brought within the amount of the revenue, and the budgets have shown surpluses averaging in five years about £600,000. The estimated expenditure for 1884-85 was £62,227,073. This equilibrium has only been brought about by the patient submission of the people to a fearfully burdensome taxation, which has seriously interfered with their physical and social well-being. Besides the state taxes about £23,750,000 is raised annually by local taxation.

Manufactures, Trade, and Commerce.—The main wealth of Italy consists in its raw produce, its chief supply of manufactured articles having hitherto been derived from abroad. The undoubted awakening, however, which has of late years taken place in the industrial, agricultural, and commercial activity of Italy has resulted in a steady, though not rapid, development of Italian manufactures. Cotton goods and woollen stuffs are still imported in large quantities from England; but there is no continuous increase in the purchase of English wrought iron, for the Italians have begun to work the iron of their own mines and to make their own railway carriages. From France the imports have decreased, because the native manufacturers produce silks which are cheaper and which the Italians like better than those of Lyons; also because gloves, ladies' boots, artificial flowers, upholstery, and the thousand knick-knacks called "l'article de Paris," for which Italy was formerly dependent on France, are now being made in the country.

In respect to its industries, Italy possesses some advantages in the existence of a moderate amount of capital in the country, in the generally prevalent spirit of confidence in the integrity and stability of the government, and in the fertility of its soil and abundant water power. But on the other hand, machinery and fuel are both very costly, there is great lack of technical knowledge, carriage is expensive, and the national and local taxes bear very heavily upon production. The price of labour is very low in Italy, but the holidays are frequent and the people have hardly the steady plodding perseverance of those of more northern climes. Then, as we have mentioned in connection with the agricultural condition of the country, the people, from ignorance and self-esteem, are unwilling to depart from the ways of

their fathers, and thus many important industries are kept in a very backward and unsatisfactory state. One special feature, however, of late years has been the flood of books and pamphlets on subjects of political economy; and it is to be hoped that, with the growth of a more utilitarian spirit and the spread of useful technical knowledge, many of the habits which have tended to impoverish the people will fast disappear.

The railway system is making rapid progress throughout the peninsula, and the total length opened for traffic in 1883 was 5651 English miles, of which about one-fourth belonged to the state. In the sessions of 1878 and 1879 the Italian Parliament passed bills for the construction of additional 3739 miles of railway to complete the existing system. Part of these are included in the numbers just quoted, and there are about 2000 miles still to be constructed, which are expected to be completed within ten years. The total expenditure in the construction of railways up to 1885 was £120,000,000. The length of telegraph lines in 1885 was 19,000 English miles, nearly two-thirds of the whole belonging to the government.

The exports from Italy consist of olive oil, wines, silk, kid and lamb skins, borax, alum, sulphur, marble, straw hats and plaits, cheese, fruits, oak and cork bark, timber, potash, charcoal, coral, anchovies, sardines, wax, essences, perfumery, liquorice, cloth of gold and silver, mosaics, and carvings in stone and wood. The totals of both imports and exports have of late years fluctuated very considerably, and Italy has shared the unfortunate severe commercial depression, in common with most European countries. The total imports for 1883 were £51,448,204, and the total exports £47,264,302. The commercial intercourse of Italy is chiefly with France, the United Kingdom, Austria, and Germany. The following figures show the trade between Italy and the United Kingdom in recent years:—

Years.	Imports from Italy into the United Kingdom.	Exports from the United Kingdom to Italy.
1882 ...	£3,484,880	... £6,480,258
1883 ...	3,380,183	... 7,121,948
1884 ...	3,167,105	... 6,993,321

The principal articles of export from Italy to Great Britain are olive oil, hemp, oranges and lemons, sulphur, chemical products, shumac, and wine. The staple articles of British produce imported into Italy are cotton fabrics, iron, coals, and woollen manufactures.

In 1884 the total number of Italian sailing vessels and steamers making long voyages was 7471, of 973,333 tons, the tonnage of steamers alone being 107,452 tons. The total number of vessels which entered Italian ports in the year 1883 was 111,296, of 18,465,381 tons, of which 26,163 were steamers of 15,029,721 tons. There cleared the Italian ports during the same year 110,554 vessels, of 18,367,948 tons, of which 15,929, of 14,975,618 tons, were steamers.

Government and Constitution.—Italy is a constitutional monarchy, and the legislative power is exercised by the king and two houses of Parliament—namely, the Senate (or Upper House) and the Chamber of Deputies (answering to our House of Commons). The Senate consists of the royal princes (when of age) and of other members, unlimited in number, who are nominated by the king for life, and must have attained the age of forty years. The members of the Chamber of Deputies are chosen by the qualified electors throughout the kingdom. A deputy must be thirty years of age, must have a slight property qualification, and cannot be declared elected unless at least one-eighth of the electors of the district have cast their votes at the election. For the purpose of choosing deputies, the whole kingdom is divided into districts, and every male who pays taxes to the amount of 16s. 8d. is a

voter. The term of election is five years, and the Parliament sits for the same period, unless dissolved by the king. Sessions must be held annually. The Chamber of Deputies contains 503 members, or one to every 57,000 inhabitants. Neither senators nor deputies receive any salary or other indemnity, but they are allowed to travel free throughout Italy by rail or steamer.

The king is advised by ministers, who are responsible to Parliament. Each of the chambers has the same right as the government of introducing new bills; but all money bills must originate, as with us, in the Lower House. The ministers have the right to attend the debates of both the upper and lower houses, but cannot vote unless they are members. Both chambers hold their sittings in public, and no sitting is valid unless an absolute majority of the members be present. The seat of government was transferred in 1865 from Turin to Florence. The honour was, however, only a short-lived one, for in 1870 the hopes of all patriotic Italians were realized by Rome being made the capital of their country.

Religion and Education.—The established religion of Italy is the Roman Catholic, but all creeds are now tolerated. The Roman Catholic hierarchy consists of forty-five archbishops and 198 bishops. All those dignitaries are appointed by the Pope, on the advice of a council of cardinals—the congregation *De Propaganda Fide*. But the royal sanction being necessary to the installation of a bishop or archbishop, and this having been frequently withheld of late years, there are a large number of vacant sees.

The immense wealth of the Italian clergy has been greatly reduced since the year 1850, when Siccaldi's bill for abolishing the immunities of the clergy and ecclesiastical jurisdiction passed the Sardinian chambers. This law was extended, in 1861, over the whole kingdom. A project of law, brought in by the government, for the entire suppression of all religious houses throughout the kingdom was adopted by the chamber of representatives in the session of 1866. It provided that all religious corporations should cease to exist from the moment of the promulgation of the law, and their property devolve to the state, which then assumed the duties of teaching, benevolence, &c., which the suppressed orders had claimed to fulfil. All monks and nuns having taken regular vows before the 18th of January, 1864, were entitled to a pension of 500 lire, or £20 each; lay brethren and sisters, to £10 each; and servants sixty years old and upwards, having served at least ten years in a monastery, may receive a pension of £5. Several monasteries were set aside for the reception of such monks or nuns as wished to continue their monastic life; and mendicant friars were allowed to continue to ask alms under certain restrictions. All chapters of collegiate churches, abbeys, ecclesiastical benefices not attached to parishes, lay benefices, and all brotherhoods and foundations to which an ecclesiastical service was annexed, were with some slight exceptions suppressed. The number of religious houses to which this law applied was 2382, and of persons 28,990, of whom 14,807 were men and 14,183 women.

During the last two centuries education was in the greater part of Italy not only neglected, but systematically suppressed. But for the peculiar relations of landlords and tenants, which brought the neglected classes into constant contact with the better educated, matters would have been even worse than in 1864, when the census showed that 71·75 per cent. of the population could neither read nor write. The proportion of the people thus completely ignorant varied from about half in Piedmont to nine-tenths in the Papal and Neapolitan states. The deplorable state of education in the country was one of the first things which occupied the attention of the government as the development of Italian unity commenced. In the army

of Victor Emmanuel education had long been compulsory, and thousands of discharged soldiers who returned to their villages acted as pioneers of culture in the most remote corners of the monarchy; and when the monastic establishments were suppressed a great part of their property was devoted to the cause of public education, in addition to a large credit annually voted by Parliament. Up to the end of 1872 a large number of model public schools, and numerous elementary and evening schools, had been opened, but facts disclosed by the military conscription were sufficiently striking and lamentable to prove the urgent necessity for a compulsory educational measure. Accordingly a stringent law was passed in 1873, by which all children, on completing their sixth year, must be sent to the parish schools, unless elsewhere educated. Provisions are also inserted whereby adults who did not at once seek an acquaintance with the rudiments of education incurred serious disabilities. The Army Bill, already described, also provided that conscripts unable to read and write should be at once incorporated in the active army, whatever numbers they might have drawn, and be retained in the army an additional twelve months if unable to read and write when their time expired. The law on primary schools as to compulsory education has been very generally applied, but is by no means strictly enforced. The number of primary public schools in 1881 was 42,510; of the pupils 1,048,781 were males and 879,925 females. The total sum allotted for public instruction is about £1,300,000 per annum. There are also 12,000 evening schools, with 600,000 pupils. There are twenty-six universities in Italy, nearly all dating from the middle ages. The best attended are those of Turin, Padua, Rome, Bologna, and Pavia. The total number of students at the various universities is about 13,000. There is an art and technical school in every town of importance, and the registered number of pupils in attendance is more than 20,000.

Italy contains a great number of public libraries, many of which are exceedingly opulent in ancient manuscripts and rare old books, though generally deficient in works of science and modern literature. Galleries of art and museums flourish in most of the principal towns, and those of Florence, Rome, and Naples enjoy a world-wide reputation. Every palace contains art-treasures of priceless worth, and the churches are enriched with masterpieces of painting and sculpture.

HISTORY OF ITALY.—The annals of ancient Italy are comprised at the outset in those of *ETRURIA*, and afterwards in those of *ROME*. Numerous valuable authorities on the subject are easily accessible, either English by origin or translated from the German—Niebuhr, Arnold, Merivale, and above all Mommsen.

The modern history of Italy begins with the downfall of the Western Empire, whose last feeble ruler, Romulus Augustulus, was dethroned by his guards. Odoacer, their Herulian leader, assumed the title of King of Italy, and thus the country was separated from the Roman Empire. The sovereignty founded by Odoacer lasted no longer than 493, when it was overthrown by Theodoric, king of the Ostrogoths. A period of confusion followed, which the reader may study in the elaborate pages of Gibbon, and which was only terminated by the establishment of the power of the Longobardi or Lombards in Northern Italy (568). This brave and sagacious people soon spread their influence over the whole of the country, and menaced the independence even of Rome itself, whose popes, in their frequent alarms, generally solicited the assistance of the Frankish kings, and rewarded them with numerous privileges.

At the prayer of Pope Leo III. Charles the Great made war upon Desiderius, king of the Lombards, took him prisoner in his capital, and united his kingdom to his own vast empire. Pippin, Charles' father, had also helped a

previous pope, and had conquered the old Exarchate of Ravenna, the part of Italy which held the longest to the Empire of the West, and this he had given to the Pope. Thereby he founded the temporal rule of the papacy, which was to last for 1100 years, finally perishing in 1870. Charles on his part recognized this gift of Pippin's. The mother of the emperor (that is, the Emperor of the East, for the Empire of the West had perished) had imprisoned and blinded her son, and seized the reins of empire herself. Charles claimed to be the successor of this unhappy Constantine, since for Eirênê (or Irene) to reign would have been an unheard-of innovation after centuries of male sovereigns. The Pope gladly crowned him emperor therefore, and as Eirênê was still left undisturbed, and Charles' orthodoxy was desirable to be marked, the title of the Holy Roman Empire at once divided the new emperor and his Latin faith from the Greek church and state.

At this time the duchy of Beneventum was independent and paid Charles tribute. Naples and Gaeta, Sicily and the "toe and heel of the boot"—i.e. Calabria and Apulia—still continued faithful to the Eastern Empire; and Venice, though independent, acknowledged Constantinople as mistress. These points of disintegration it is necessary to bear in mind. Beyond the Eastern emperor's sway and the Frank emperor's sway there was the Papal State; and the rest was split into tiny counties, and principedoms, and cities. After Charles' death many of these enlarged themselves, and the great feudatories of the new empire also threw off allegiance. Italy had enjoyed a brief period of sunshine under his magnificent statesmanship, but no permanent bond was made, and she shared in the dismemberment of the great empire. Lothar as emperor had for his share of the division Italy and a strip of roughly the same width continued across Europe to the North Sea, dividing what soon became France from what soon became Germany.

In 827 the Saracens began the conquest of Sicily, and completed it in about fifty years. Even the popes had at this time to pay them tribute, and they ravaged the country up to and beyond Rome. Many towns became permanently Saracen, and this had a great influence at several times of crisis in the later history of the peninsula. Indeed, between the Saracens in the south and middle, the Northmen and the Magyars in the north, Italy in the tenth century suffered terribly. The papacy, which had in similar times of discord taken the lead in bringing about better things, was at this time (925) at its lowest degradation. The infamous Theodora and her daughter Marozia were mothers and mistresses of popes, and ruled as they pleased. Marozia married Hugh of Provence, who claimed to be King of Italy, the Frank Empire having now become distinctively a German Empire. In 951 Otto, the great emperor (of Germany), descended on Italy and brought order out of chaos, and eventually reunited Italy to the Holy Roman Empire, ruling it chiefly by deputies. He was not crowned till 962. After his time the empire included, sometimes really, always nominally, the kingdom of Italy, as in the great Charles' day. Therefore the titular sovereign of Italy down to our own day was always a foreigner, and this kept it from attaining unity. The separate elements were individually too weak for any of them to attain a commanding position; the foreign domination, though hated, was always strong enough to maintain its historical connection, and from time to time to reassert actual authority. Had any Italian state been able to take on a definite headship the true (Italian) kingdom of Italy might not have been waited for through all these ages.

The large municipal liberties granted under the old Roman Empire to the great cities of Cisalpine Gaul, called now, after the Longobards, Lombardy, had been carefully cherished through the wars of the various races which swept across it in these dark ages, and towards the

beginning of the eleventh century many of the cities had won from the emperor charters of independence, and formed small sovereign states by themselves. This again, however one may honour the new development of the old Roman municipal liberty, was a source of disastrous weakness to the country at large, owing to the internecine jealousies of these cities. Besides Venice, Pavia, Milan, Verona, Genoa, &c., and a little further down the peninsula, Pisa (and later on Florence and Siena), are types of such civic republics. Venice as yet was almost purely a maritime city, with hardly a grip on the mainland, and far more Byzantine than Italian in her alliances. Hence the lovely Eastern type of her Gothic architecture, and the gorgeous splendours of the Doge's Palace and St. Mark's. Of the other cities Pisa was the leader for a century and a half as yet. She it was who drove the Saracens from the island of Sardinia and formed it into a Pisan colony at the beginning of the eleventh century, and who at the beginning of the twelfth century acquired also the Balearic Isles. Her splendid architectural monuments still show her original preponderance. The great trade of Pisa, Genoa, and Venice with the East was vastly assisted by the Crusades when they began.

In the eleventh century, from 1037 onwards, a band of Norman soldiers of fortune, under Robert Guiscard and the other sons of Tancred de Hauteville, conquered first Apulia, then Calabria, then Sicily, and by 1127, under Roger the Great, all the ancient Lombard duchies and the ancient Greek towns of Southern Italy had fallen under the new Norman rule. Roger now styled himself King of Sicily.

The long contest between the empire and the papacy is elsewhere told in detail in this Encyclopædia. It began with the necessary papal reforms of the Emperor Henry III., which led to the consequent revolt of the popes, led by Hildebrand, against Henry IV., and the humiliation of that emperor at Canossa; a humiliation amply avenged by Henry V., who in his youth had at first been used as a tool against his father by the hands of the popes. But the death of the famous Countess Matilda of Tuscany at this time gave the popes an enormous increase of power, for she left to Rome her immense possessions, extending from Mantua to Pisa and downward nearly to Rome. Henry V. seized it, however, and it was many years before the popes really acquired any of this vast inheritance. Florence rose to independence like the northern towns, and so also did Siena, and rivalry and frequent war took place between these two great Tuscan cities. At this time (beginning of the twelfth century) the refuge of the popes was with the Norman kings of the south, and pope after pope in time of trouble took shelter in their dominions.

The death of Henry V. without children in 1135 caused a strife for the empire. The great Bavarian family of Welf were opposed by the Hohenstauffens, and as Waiblingen was a possession of the latter, the strife between the Papalist Welfs and the Imperialist Waiblingens gave the opposing parties their war cries, and in their Italian dress as Guelfs and Ghibellines all Italy rang with them. It needed only that Florence should be Guelf for Pisa to be Ghibelline; that Pavia the ancient capital of Lombardy should be Ghibelline, for Milan the new capital to be Guelf, and so with the rest. Long after the parties had got inextricably confused as to their aims, and the original objects had vanished, these terrible names continued to serve as rallying points and centres of strife. The great emperor Barbarossa (Frederick I.) had a heavy struggle with the Pope on the one hand and the Lombard cities on the other. His imperial rights were defined in 1158 after Milan, the ringleader of resistance, had suffered severely. But revolts were frequent, and at last the great emperor utterly destroyed the city. However, in 1167, the famous Lombard league was formed, and all the other cities, jealous of Bar-

barossa's authority, helped Milan to rebuild her shattered walls. Pavia, always Ghibelline, stood out. The league built Alessandria, which they named after the reigning Pope, Alexander III., close to Pavia, hoping to crush it by rivalry. The emperor besieged Ancona, besieged Alessandria itself, but though fairly victorious never attained complete success. At length, much wasted by fever and by the long struggle, his forces were definitely worsted by the Milanese at Legnano in 1176, the citizens fighting round their *carroccio* (city standard) so gallantly that success was assured, and Barbarossa with difficulty himself escaped. He had to make peace; and some little time afterwards the whole rights of these great Lombard cities were settled at Constance in Swabia in 1183. The towns were to administer their own laws, make peace and war, &c., the regalian (imperial) rights were fixed, the cities kept their supreme magistrates, consuls, &c., but the emperor had to invest them, and an imperial judge was to be admitted to each town. Thus did these great cities attain virtual independence. Their vigorous and individual character led them to embellish their towns with splendid structures and to train up noble citizens. Had they only been able to keep each other's rights untampered with, to avoid jealousy, and to let their rivalry be in noble things, Northern Italy would have been another and a finer Greece. Unhappily this was not to be. Yet the traveller passes in amazement from one city to the other, lost in admiration of sites and edifices, and lavish ornament of the finest art bestowed upon them by and for the citizens of these magnificent municipalities. In one sense it is melancholy; but at any rate it shows the grand possibility that lies before a vigorous community able and willing to spend freely and worthily for the good of all. The rise of these great cities caused a corresponding depression of the power of the nobles; they became citizens; but this was not an unmixed gain, for their superior wealth and station made them turbulent citizens, and their palaces, such as the later-built ones which still exist at Siena and Florence, &c., show that they were built as much for military as for civic purposes. Their houses were fortresses. Each city gradually split up into factions, though upon any outward danger their ardent patriotism would unite them till the danger was past.

Frederick II. was the grandson of Frederick I., Barbarossa. He was the son of a Sicilian princess, and his father Henry had, in 1194, successfully claimed the Norman kingdom of Sicily. Frederick's southern birth and education, his intimate acquaintance with the language, religion, and customs of the Saracens who still peopled Sicily, added to thorough culture and high and noble aims, make him the most interesting and splendid figure of these times. The popes could not understand the breadth of mind which enabled him to legislate nobly for his Mohammedan subjects, and to make a treaty with the Sultan of Egypt himself, gaining Jerusalem thereby. They even preached a crusade against him. But this is fully detailed elsewhere. See **FREDERICK II.**

At the close of the twelfth and the beginning of the thirteenth centuries, the great contemporary movements of St. Francis of Assisi and St. Dominic, with the foundations of the Franciscan (1209) and the Dominican (1215) orders of friars, shook the religious world to its base. The Franciscans aimed at purity of life, the Dominicans at purity of faith. The first caught the public ear rather the earliest. Great churches of brick, plainly built, cheap, roomy, rose all over Italy. As soon as the devotion of the friars had touched the wealthier classes, these churches, with their vast wall spaces, were covered with beautiful frescoes. A wonderful art sprang into vigorous existence, soon to develop into the finest painting the world has ever seen. Alas! this very piety turned the Franciscans into a wealthy sect, and this fervour for true faith led the Dominicans to found the Inquisition.

With the death of Frederick II. the imperial power over Italy became a mere shadow. The great cities of the north were an overmatch for any campaigning Army in their present flourishing condition; and the south was now to pass into other hands. This latter result arose thus. Conrad, the son of Frederick, having to fight for his crown in Germany, left his kingdom of Sicily in charge of his brother Manfred, an illegitimate son of Frederick's. Meanwhile the Pope (Innocent IV.) sold Sicily to King Henry III. of England for his son Edmund. Edmund assumed the royal state and title though he never left England, and the heavy price his foolish father paid went far to cause the barons' war and the loss of his crown. Conrad died in 1254, leaving a young son Conradin. Manfred, as regent, still continued in perpetual struggle against the Guelph attacks, encouraged and often carried on by the Pope. The Ghibellines, left by Conrad's death without a head, suffered all over Italy. In the north Florence in this year of victories (1254) took Volterra and Siena and humbled Pisa, definitely springing at once to the headship of Tuscany. A year or two later the great Ghibelline power which Ezzelino da Romano had raised, as Tyrant of Verona, Padua, and Vicenza, fell to pieces before a crusade preached against him by the legate of Pope Alexander IV., and responded to by Milan and Venice (1259). By this time Manfred had won Sicily, had assumed the crown (appointing that Conradin should succeed him), and had so firmly established himself as to be able to take the headship of the Ghibellines throughout Italy. In this new position he was appealed to by those of Florence who had been exiled by the dominant party in 1254. Pisa and Siena had also gathered head, and were ready to humble Florence; Genoa, Modena, and the Guelphs of Lombardy joined Florence. A great battle was fought at Monte Aperto in 1260, and Florence was utterly crushed. A proposition was made to blot her out from the face of the earth, and was only stayed from execution by the eloquent pleadings of the Florentine Farinata, who, though he was a Ghibelline, loved his city too well to destroy it even for the good of his party. For the time Tuscany was utterly lost to the Guelphs.

The next pope, desiring in his despair to raise more money and to bring new allies into the Guelph cause, sold Sicily to Charles of Anjou, brother of Louis IX. (St. Louis) king of France, after the latter had refused for himself to have anything to do with it. The fear of the Pope was that the States of the Church might be hemmed in by the emperor, if Sicily (which included much of Southern Italy) and also Lombardy were again to be imperial states, as under Frederick II. they had been. Clement IV. was pope when Charles of Anjou arrived. He declared the new war a crusade, and levied the usual crusader's tax to support it, just as if it had been directed against the Saracens of Jerusalem. Every nerve was strained, and the supreme effort was crowned with success. Manfred fell at Benevento in a great battle, 1266, Charles entered Naples in triumph, and the Guelph party rose all over Italy. Those of Florence, resuming the sway, paid Charles the compliment of electing him signor for two years. Conradin, however, was still at liberty, and drawn on by the discontent raised by Charles's tyrannous government he entered Italy with a small German force. Pisa, Pavia, Siena, and other Ghibelline cities joined him as he held his court at Verona; Sicily revolted; Rome welcomed him as he advanced. But at Tagliacozzo in 1268 the French gained a complete victory; Conradin escaping was detained and sold to Charles by John Frangipani. Charles condemned Conradin as a rebel, and he was executed as such, to the eternal disgrace of the house of Anjou. What is worse, the Pope is believed to have counselled this crime. Charles rose to be the head of Italy, and openly aimed at the empire; fortunately for mankind he never obtained it.

The brutality of his government at length brought about

the massacre famous in history as the Sicilian Vespers. Manfred had left a daughter Constance, now wife of Peter, king of Aragon, who in consequence claimed the throne of Sicily. Everything was ready for a rising in his favour, when a spark set the whole island aflame. This was a public insult offered by a French soldier to a Sicilian bride as she was going to vespers. All the French in Sicily were murdered, and the island in a few days was wholly free. Charles hurried across and besieged Messina; Peter also hurried across the sea, landed and was proclaimed king, forcing his French rival to retire. After a desultory war of twenty years with Charles and Charles's son, Frederick, the son of Peter, was recognized as sovereign of Sicily, and the Angevins as sovereigns of Naples and the mainland kingdom. Sicily was always Ghibelline, Naples Guelfic. At this time Pisa had fallen completely under the influence of Florence. A crushing defeat at sea in 1284 at the hands of Genoa, on the very spot where forty-three years before she had won a glorious victory over Genoa, had broken the Pisan power. The Pisans never forgave their *podestà*, who acted as admiral. Ugolino della Gherardesca was eventually, upon this and other charges, including a charge of aiming at monopolizing the supreme power, thrown into prison, with his two sons and two grandsons, and there let starve (1288). Dante's famous passage ("Inferno," xxxiii.) records their terrible fate in lines which are the wonder of the world for their appalling brevity and power. Thus ends the great Florentine—

"Ah Pisa! Thou opprobrium of all people,
Even if Count Ugolino had the fame
Of having in thy castles thee betrayed,
Thou shouldst at not on such cross have hung his sons,
Guiltless of any crime—thou modern Thebes!"

Florence at this time was ruled by six priors, chosen from the six greater arts or trades of the city, holding office for two months each, and forming collectively the *signoria*. They lived in the famous palace, so well-known to travellers, and at the public expense, and carried out their decrees through a Gonfalonier of Justice. Venice had a somewhat similar constitution, with a supreme council of six; but here the executive prince was more powerful than the council, was called Doge, and was chosen for life. There was further a great council of all the principal men of the city. In 1297 this council was closed against all not of descent from certain noble families; and in 1310 a further grave change was made by the council, jealous of the Doge, nominating a secret Council of Ten, to whose power even the Doge himself was subject. Soon after the right to sit in the great council was made hereditary, and Venice thus became the closest oligarchy in the world. (Genoa adopted the Venetian constitution, with doge and council later on, in 1339.) Milan at this time—the end of the thirteenth century—was ruled by the great Ghibelline family of the Visconti, Verona by the magnificent house of Scala, Ferrara (with Modena and Reggio) by that of Este. In each case the rule, though quite undisputed, resembled the power of the Medici, afterwards to rise in Florence—it was rather seen in fact than in titles or in assumption of public state. A parallel might be found in the rule of the early Cæsars, practically absolute while yet retaining their personal simplicity and the republican forms of government.

The close of the thirteenth century was marked also by the feuds between the extreme Guelfs and moderate Guelfs of Tuscany, the *Neri* and *Bianchi* (Blacks and Whites). The *Neri* worked hand in hand with the violent Pope Boniface VIII., and Charles of Valois, brother of Philip IV. of France, was invited to make a second French invasion of Italy in Guelfic interests (1301). The *Bianchi* were exiled, Dante among them, and were driven by the bitterness of the *Neri* into the Ghibelline cause, which at first they opposed. The plunderings of Charles, the internecine feuds of Guelf

and Ghibelline everywhere, of *Neri* and *Bianchi* in Tuscany, of Orsini and Colonna at Rome, the quarrel of Boniface with Philip of France, ending in the Pope's humiliation and death (1303), combine to form a picture distressing in its bloodstained confusion, but out of whose whirling abyss rises the sublime poem of Dante, a cry from the very heart of woe otherwise inexpressible. The joy with which Dante and other true patriots welcomed the advent of the Emperor Henry VII. in 1310, who crossed the Alps with the avowed object of restoring peace and unity to Italy and judging amidst the conflicting claims which were deluging the land with blood, was only equalled by their sorrow when he died of a sudden sickness, or perhaps poisoned, in 1313, and with him the last hope of order seemed to expire. It is impossible to trace here the scramble which ensued. Pisa in a war with the King of Aragon lost Sardinia; Vicenza, Padua, and Treviso fell to Verona under Can Grande della Scala (Dante's patron); Philip IV. of France, after the ruin and death of his old enemy Boniface VIII., caused a French pope to be elected (1305), and kept him a half-prisoner in France, where at Avignon a new race of popes sprang up, so that no pope was seen in Rome for seventy years; all Italy was a hopeless wreck of confusion. Joanna of Naples, for love of Louis of Tarento, killed her husband Andrew of Hungary in 1345; whereupon Charles of Durazzo, cousin of the murdered man, was sent by King Louis the Great of Hungary, who was Andrew's brother, with an army against the wicked queen, and the king followed himself in 1347. Joanna fled to Pope Clement VI. at Avignon, was absolved, and married her lover. The price demanded was the sale of Avignon to the popes. Avignon was just outside the frontier of France at that time, though thoroughly within its control, and belonged to this abandoned woman. It is not to the credit of the popes, but yet we learn it with some satisfaction, that the money was never paid. At this time the people of Rome, worn out by the conflicts of the nobles, revolted and set Niccolò di Rienzi at their head as tribune; but treachery and the long absence of order overthrew his government in a few months, and he fled for his life in January, 1348. (He was afterwards seized by the Pope and imprisoned at Avignon, 1351, but was freed and sent by him to Rome in 1354, in a desperate hope of restoring order by his means, which, however, utterly failed, and cost Rienzi his life.) In the year 1348 the plague fell upon Italy with disastrous fury: Naples lost 60,000 inhabitants in a few months, Pisa lost seven out of every ten. Siena was so stricken as never afterwards to recover prosperity. This is the plague of which Boccaccio speaks in his "Decamerone." The selfishness and lawlessness born of this scourge added yet another horror to the unhappy country.

In 1377 Gregory XI. returned to Rome, and on his death in 1378 the great schism began. At Rome Urban VI., and at Avignon the so-called Clement VII. were simultaneously elected. Two and sometimes three popes reigning at once continued to be the scandal of Christendom till the Council of Constance, when Martin V. was elected and universally acknowledged in 1417. The old republican spirit was now dying out; exhausted by the long disorders town after town submitted to absolute rule. The lords who thus rose were many of them strong and good rulers, and much prosperity was felt under them. The great system of banking arose; the power of the great Lombard cities is shown in the name of the street of banks in London, Lombard Street. Edward III. of England went bankrupt to the Lombard cities for money borrowed for his French wars, in a right royal and magnificent style. Two bankers of Florence alone lost by him £5,000,000 of our present value. The large profits of trade brought much luxury. Soldiers were now not obtained by arming the citizens themselves, but bands of hired mercenaries were engaged. One company under an Englishman, Sir John Hawkwood, was among the most famous. These men

fought faithfully on the side which engaged them, but at the end of their term they would with equal fidelity pass over to the enemy if he offered better pay. Such *condottieri* suited despotic rulers, however, as their fidelity was to persons, not to principles, and they suited the citizens, who were getting to love their wealth and luxury better than their liberties. In 1395 Gian-Galeazzo Visconti was created Duke of Milan by the Emperor Wenceslaus, thus acquiring a formal title to the authority long held by his family. The Count of Savoy, the Marquis of Montferrat, and the Lords of Padua, of Ferrara, and of Mantua were the other independent princes of North Italy at this time. Of these, Francesco da Carrara, lord of Padua, fell in 1402, for he seized Verona on the death of Gian-Galeazzo, first duke of Milan, whereupon Venice, aided by Gonzaga, lord of Mantua, overthrew him, and conquered both Verona and Padua, as well as Treviso, Feltro, &c., henceforward figuring as one of the principal powers of the mainland of Italy. Pisa on Gian-Galeazzo's death fell to an illegitimate son of his, Gabriello Visconti. He, unable to hold his prize, sold it to Florence in 1405. Pisa resisted the transfer for nearly a year, but fell at last, and though Florence always treated her well, the proud Pisans pined under the yoke, and the trade and wealth of the once famous city gradually departed.

In 1409 the Queen of Sicily married a son of the King of Aragon, thus once again bringing the island into Spanish control. The mainland kingdom, with Naples as its capital, also retained the name of Sicily, from old Norman associations; so that when in 1435 Naples and Sicily both fell to the King of Aragon, the curious title of the "kingdom of the Two Sicilies" arose. The two great *condottiere* leaders at this time were Sforza on the side of Queen Joanna II. of Naples and the Angevins, and Braccio Fortebraccio for the Spanish party, and the whole history of the time is almost a duel between them. Sforza left a son, even a more skilful soldier, and by far a better diplomatist than himself. Francesco Sforza, who was serving under the Pope, married Bianca, a natural daughter of Filippo Maria Visconti, duke of Milan, and thus gained a shadowy claim on the succession. The Pope and Milan were at this time desirous of clipping the wings of the rising power of the Medici family at Florence, but their efforts only established Cosimo de' Medici the more firmly. He gained the title of *Pater patriæ*, so much was he beloved by his Florentines. In 1447 Sforza's chance came; the last Visconti duke died without heirs. His sister, Valentina Visconti, had married the Duke of Orleans, brother of Charles VI. of France, whence arose a French claim on the duchy, source of many woes; but Sforza was at hand, Bianca was much loved, was a Visconti, though by the left hand, and in the end the city submitted to him as duke in 1450. Now therefore, beyond the temporal dominions of the popes, Italy was shared practically between the oligarchical republic of Venice, the monarchical republic of Florence, the duchy of Milan, and the kingdom of the Two Sicilies.

The grand period of revival of literature and art now began, that which is fitly termed the new-birth, or Renaissance, commonly known under its French title of the *Renaissance*. This was largely due to the taking of Constantinople in 1453 by the Turks under Mohammed II., and the consequent dispersal of the art and learning of the Greeks, who fled before the dreaded Turks into Italy. Mohammed also followed, and Europe, thoroughly alarmed, saw with horror Otranto in Mussulman hands in 1480. Had not the conqueror died and left a disputed succession at this time, who knows what might have happened? Meanwhile under Cosimo de' Medici Florence grew apace; palaces rose thick in her streets, the wondrous dome of the cathedral was erected by Brunellesco, and Masaccio astonished the world by the frescos of the Carmine, which later on Michelangelo studied from. Cosimo's son Piero

was infirm in health, but as clever a ruler as his father. At his death in 1469 his sons Lorenzo and Giuliano, both very young, were left as heads of the state, under guidance of Soderini and other nobles. Now came an era of conspiracies. Galeazzo Sforza (second Sforza duke of Milan) was stabbed as he entered St. Stephen's Church in Milan in 1476, but his brother Lodovico played his cards well and succeeded him. A far deeper conspiracy was laid in Florence against the Medici by the Pazzi family, and the young lords were attacked in the cathedral at the moment when they knelt before the raised host at mass. Giuliano was killed; Lorenzo escaped (26th April, 1478). Lorenzo afterwards became that splendid statesman, that generous lover of art and protector of all that was learned, noble, and wise (among others the martyr-saint Savonarola), whom men in their admiration surnamed "il Magnifico;" and it is owing to his overwhelming influence that no less than twelve years of rest were allowed to poor Italy, from 1480 to 1492. Surely no mean boon to a land so sorely troubled!

It was an ill day for Italy when Lorenzo il Magnifico died in 1492. His son Piero succeeded him at Florence. Another son, Giovanni, was afterwards a cardinal, and in the course of time he became Pope Leo X., while his brother's illegitimate son Giulio was also later on a cardinal like his cousin, and he in due time became Pope Clement VII. These two Medici popes were two of the most unhappy tenants of the chair of Peter; for Leo saw Germany split off under the Reformation, and Clement saw England split off under Henry VIII., never more to be united, either of them, with the main body of Latin Christianity. The foul Borgia disgraced Rome in 1493 as Alexander VI.—a monster of every vice; and with his shameless schemes to rob Italy and the church for his son Cesare and his daughter Lucrezia Borgia the peace of Lorenzo the Magnificent ended. Everywhere troubles broke out. Lodovico Sforza, uneasy lest his young nephew (the rightful heir, son of the late Duke Galeazzo) should claim the duchy of Milan that he had usurped, offered to Charles VIII. of France to support him in a claim on Naples derived from an old connection with the Naples house of Anjou, if Charles on his side would confirm him in his duchy. Charles was to conquer Naples, to cross to Greece, drive out the infidel Turks, win back the holy sepulchre—such was the dazzling career the Sforza showed him. On his side Lodovico purchased the title of duke from the Emperor Maximilian, Milan being a fief of the empire. He even then did not feel very secure, because Valentina, sister of the last Visconti who reigned in Milan, had left descendants, and her grandson Louis, duke of Orleans, had also, curiously enough, become next heir of the crown of France, as Charles VIII. was childless. After great preparations Charles entered Italy in 1494; Piero de' Medici, who had allied himself with Alfonso of Naples (Sicily had again split off from the mainland kingdom), fled to the French camp to make his own terms. His subjects ejected him when he returned, and he never saw Florence again. Meanwhile Charles gratified his vanity by freeing Pisa, by entering Florence and Rome, and eventually Naples, lance on thigh, as a conqueror. Every one submitted before him. But as soon as Charles began plundering the land for the benefit of his followers, a strong league was formed against him, and he hurriedly left Naples to return in 1495. He had even to fight his way home at Fornovo. As soon as Charles had gone the Spanish king of Naples, who had fled, returned and began to reconquer his kingdom. The whole great French expedition, undertaken at ruinous cost, had gone off in smoke. Sforza alone had profited. A greater man than he had also played a stake, and he had lost. This was Girolamo Savonarola, who, having hoped all things from the French king, even to the purifying the slough of Rome from the vileness of the Borgias, now found his fate. He

was tried as a heretic and a seducer of the people, and hung as a common felon (1498). Savonarola's greatness with the whole of this period of Florentine life, lives before us in the priceless pages of George Eliot's "Romola," just as the life of two centuries before lives in those of Dante's "Commedia."

In the year of Savonarola's martyrdom Charles VIII. of France died, and Louis XII. succeeded. Louis claimed to be heir to Milan through his grandmother Valentina Visconti—a bad claim since it was a male fief, but good enough when backed by the crown of France. He conciliated Cesare Borgia, son of the pope, and now a great power in Italy, by giving him the French duchy of Valentinois, so that Cesare is usually styled by Italians "il Duca Valentino." In 1500 Lodovico was beaten, taken prisoner, and sent to Lyons, and Louis XII. was undisputed Duke of Milan. He now determined to strike for Naples, on the old French Anjou claim of his predecessor. Here too in 1502, by skilful alliances, he isolated the king, who surrendered and went into honourable captivity in France. But the King of Spain, who was to have a share in the plunder of his relative of Naples, quarrelled over his share; the French were attacked and badly defeated in December, 1504, at Mola near Gaeta. Piero de' Medici was drowned in a stream during the rout of the French army. Louis withdrew his forces, and the King of Spain reigned in Naples. Louis compensated himself by seizing Genoa, and by selling Pisa in 1509 for a heavy sum to their old masters the Florentines, against whom they had gallantly struggled, weak as they were, for nearly fifteen years, since Charles VIII. had set them free.

Venice had risen to enormous power, and in 1508 the League of Cambray was formed against her by the Emperor Maximilian, the Pope, the Kings of France and Spain, the Dukes of Savoy and Ferrara, and the Marquis of Mantua—all the powers of Italy. Each was to have a share in the plunder. Venice was reduced once more to her islands alone. But the Pope (Julius II.), alarmed at the power the "barbarians" had gained in Italy, soon repented of what he had taken so large a part in; and formed counter alliances, called the Holy League, with Venice, the Swiss, and afterwards the Spaniards, and even with the King of England. Venice arose again as rapidly as she had fallen. Her troops, with those of Rome and Naples, met the French in 1512 at Ravenna. The French gained a doubtful victory, but lost their brilliant general, Gaston de Foix, duke of Nemours, and with him the whole spirit of the army. Maximilian, with 20,000 Swiss, now joined the League. A month or two, and of all his recent conquests Louis only retained a few castles. Massimiliano Sforza was made Duke of Milan in the room of his father, Lodovico, and the Medici returned to Florence. Pope Julius had driven out one set of barbarians. "If heaven allow," said he, "Naples shall also have another master." But it was not to be. Julius died in 1513, and the revival of Medicean greatness caused Giovanni de' Medici to be chosen as his successor. He took the title of Leo X. He practically ruled Tuscany. Venice and Milan were free; Naples, Sicily, and Sardinia were annexed to Spain at this time. In 1515 Louis XII. was succeeded by his cousin, Francis I., who at once revived the Milan claim. Venice openly joined him. The Swiss, who upheld Sforza, gave Francis battle at Marignano, and though they retreated, the victory was a hard one for the French. Francis was wounded several times. The Swiss suffered so severely that they left Italy altogether, and Francis was master of Lombardy. But Leo X. in 1519 invited the young King Charles I. of Spain, who had just become the Emperor Charles V. of Germany, to enter Italy as emperor and chase the French from it once more. In 1525 Francis was defeated and captured at the battle of Pavia, and sent into Spain to prison. Charles was now master of North

Italy, but also of South Italy, and the Pope trembled for his safety. The times of Frederick II. were come again, and he was hemmed in north and south. Consequently when Francis was released from Spain in 1526 a strong alliance was formed by Venice, Milan, France, and the Pope. But Charles' forces, led by the great French exile, the Constable of Bourbon, shut up the Pope in his Castle of St. Angelo, and sacked Rome under his eyes till he surrendered (May to June, 1527). Genoa also revolted from France in 1528 under the patriot Doria; and eventually a large French army under De Lautrec perished in Naples in a disastrous way, more by sickness than by war, and Francis had to give up his Italian designs. Meanwhile, with the reverses of the Pope (a Medici, Clement VII.), Florence had recovered her spirit; the Medici were accordingly driven out a second time in 1527. All through Italy, at his coronation as emperor by the Pope in 1530, there was no power which could withstand Charles' will. The Duke of Milan was childless, and at his death Charles took over the territory as a lapsed fief. But Charles saw fit to unite with the Pope, and Clement was determined to possess Florence once more. The great republic made a gallant stand, Michelangelo being the chief engineer in the fortifications (which yet stand in great part), but she fell in 1530, and Alessandro de' Medici became the first Duke of Florence. From the rise of Florence to independence at the death of the Countess Matilda till the enslavement of the great Guelfic republic was just 415 years. In 1570 a further degradation awaited her, for Duke Cosimo de' Medici took the new title of Grand-duke of Tuscany, and Florence was no longer a city-state. (The last Medicean grand-duke died in 1737.) This Duke Cosimo was he who conquered Siena in 1547, after such terrible slaughter that the whole country between it and Florence was a waste, and has remained little better than a pestilential fever marsh to our own day. Much else of change was happening. Luther had begun the Protestant Reformation in 1517. In 1545 the Council of Trent met to reform the Roman Catholic Church, and sat off and on for twenty years. The order of Jesuits was founded in 1540, and the old Inquisition of St. Dominic at once took a new and worse life upon it. The Turks took Cyprus from Venice in 1570, and slew or enslaved the whole of the Christians of the island. Thence they sailed for Venice itself. The Venetian cry for help brought forward Spain and the Pope; the Turks were met outside the Gulf of Lepanto and thoroughly beaten, 1571, to the relief of Christendom.

In the seventeenth century the greatest features are the rapid rise of Savoy (with Piedmont) to the leading state of North Italy, under a succession of able dukes; the decline of Spain, and hence of Spanish influence in Italy; and the decay of Venice. In 1647 the viceroy of Spain put a tax on fruit in Naples, the last refuge of the heavily-taxed and miserably-poor Neapolitans; and the result was the famous revolt under Tommaso Aniello (Masaniello), a poor fisherman of Amalfi, which for a brief time gave the people their liberty. In 1700 Charles II. of Spain died childless, and the Austrian house, which had begun with King Charles I. (the Emperor Charles V.), ceased. Louis XIV. of France claimed Spain, and eventually won it, for his grandson Philip, who as Philip V. founded the Bourbon line of Spain which reigns there to this day. But the claim was not quietly acquiesced in. Italy of course came in for a heavy share in the resulting war, called the War of the Spanish Succession. The French occupied Lombardy, and were joined by Tuscany and Milan. Savoy deserted them in 1704 for Austria, and was punished by the Duke of Vendôme overrunning the whole duchy save Turin, which the famous Prince Eugène saved by a brilliant victory. In 1706 that great commander drove the French quite out of Italy. In 1713 the victories of Marlborough in Ger-

many made Louis XIV. only too glad to agree to the miserable peace of Utrecht, by which the enemies of the great English duke at home terminated a war for their party purposes. Charles VI. of Germany received by this peace Milan, Naples, and Sardinia, as well as Mantua (on account of its French alliance). The Duke of Savoy was made King of Sicily and was crowned at Palermo, and Savoy was recognized as an independent state. The Italians passed from the power of Spain to that of Austria, a change from the worse to the less bad at all events.

Philip V. of Spain did not, however, abandon all hope of Italian territory. Especially was his second queen anxious for her own children to be provided for, as her stepson would of course succeed to the Spanish crown. She had claims on the grand-duchy of Tuscany. Philip therefore suddenly seized Sardinia and threatened Sicily. But England, France, and Holland joined Austria to resist this breach of the peace of Utrecht, and Admiral Byng (Lord Torrington) soon put the Spaniards to flight (1719). At the same time, to appease Austria, Savoy was made to yield his new kingdom of Sicily in exchange for Sardinia (1720). As King of Sardinia he found he had changed Sicily, one of the finest lands in the world, for a rocky waste. Charles VI. reunited the mainland to the island Sicily, and again revived the oddly named "Kingdom of the Two Sicilies." The King of Sardinia was therefore quite ready to join France in 1733 with the intention of driving the Austrians from Italy, and in exchange for Sicily he agreed to take Milan if they were successful. He speedily occupied that territory and his ally was equally successful in the south, so that Don Carlos of Spain, the son (by his second queen) of Philip V., was acknowledged as king of the Two Sicilies, and founded the Bourbon house of Naples, which lasted (with an interval of eclipse during the Napoleonic period) till Garibaldi overthrew it in 1860. But at the treaty of Vienna in 1738 the King of Sardinia (Charles Emmanuel) was neglected; and Milan, which he had hoped for, was given up to Austria to pay for the loss of the Two Sicilies. Charles Emmanuel only got an extension of frontier. Francis, duke of Lorraine, gave up that duchy to the ex-king of Poland (Stanislas), and received in exchange the grand-duchy of Tuscany. He married the Empress Maria Theresa; and when the War of the Austrian Succession began, Italy had to take part in it on this account. Francis of Tuscany was elected emperor in 1746, and his troops, with those of the King of Sardinia, defeated the Bourbon army at Piacenza in a great battle. In 1748 the peace of Aix-la-Chapelle terminated the war, and left Italy at peace till the invasions of the French republic in 1796. All the land save Lombardy, which was Austrian, was now governed by absolute princes independent of foreign rulers. Parma was given to a Bourbon, Don Philip, brother of the King of the Two Sicilies, and son (by the second queen) of King Philip V. of Spain. Four republics yet remained, Venice, Lucca, and the little San Marino, and Genoa, which was under the "protection" of France. Corsica, the old possession of Genoa, was now ceded to her new "protector." In 1765 Tuscany became independent of the empire at the death of the Emperor Francis, passing to his son Peter Leopold. When Leopold became emperor in 1790 he passed over the grand-duchy of Tuscany to his second son Ferdinand.

Such was the division existing when Napoleon entered upon his meteor-like career, and the soldiers of the French Republic poured into Italy in 1796. A succession of rapid movements and brilliant victories compelled the King of Sardinia to purchase the safety of his throne by the cession of Savoy and Nice. Austrian Lombardy was overrun and conquered, and the Roman pontiff and the Duke of Parma only secured a temporary immunity from invasion by heavy sacrifices.

In 1797 Napoleon formed the Cisalpine republic out of

Milan, Mantua, Modena, portions of Parma, Bologna, Ferrara, and Romagna, a republic which could only flourish under the shadow of French bayonets. Genoa was the capital of a short-lived Ligurian republic, Bologna of a Cispadane republic, Rome of a Tiberine republic. In the following year Naples was constituted into a Parthenopean republic, and various other changes in the partition of unhappy Italy threw it a bound and helpless victim at the feet of revolutionary France. The King of Sardinia was forced to abdicate, and the Pope, Pius VI., was carried a prisoner to France. Thus it remained until Napoleon assumed the imperial purple, when he flung aside all pretence of respecting Italian liberty, and founded the kingdom of Italy, placing the iron crown on his own brow, and appointing his stepson, Eugène Beauharnais, viceroy. This kingdom did not include Naples, which was erected into a separate sovereignty for Joseph Bonaparte, and when he became King of Spain Naples was turned over to Napoleon's brother-in-law, the dashing cavalry leader, *le beau sabreur*, Joachim Murat; nor Tuscany, which as a grand-duchy fell to the lot of Napoleon's sister Eliza. In 1809 the secular authority of the popes was declared at an end, and the States of the Church occupied by the French. Rome became the second city of the empire, and a pension of 2,000,000 francs was assigned to the "Holy Father." One good resulted from all this tyranny. The Italians for the first time were ruled from Lombardy to Calabria by one power, and the lesson sank deep into men's minds.

With the fall of Napoleon Italy returned in most respects to its previous condition, except that Austria was enriched and strengthened by considerable territorial accessions, notably those of Milan and Venice, by the congress of Vienna of 1814-15. Parma was given to the ex-emperor's wife, Maria Louisa. (The Holy Roman Empire was conspicuously absent among all these restorations. It had died for ever in 1806.) But it is seen that only the King of Sardinia and the Pope were truly Italian sovereigns; the rest of Italy was ruled by foreigners. The growth of liberal opinions and the rise of a national spirit, however, soon disturbed the seeming tranquillity of the peninsula, and in 1820 Naples and Piedmont, in 1831 Modena, Bologna, Parma, and other states, stimulated by the success of the French revolutionists, broke out into revolt. As they derived no assistance from any European power, Austrian bayonets quickly restored in both instances the expelled princes. But the desire of independence, and the bright dream of Italian unity, had taken too firm hold of the minds of the Italians to be readily annihilated, and as this desire increased—as this dream developed—so grew a bitter hatred against the tyranny of Austria, which was fomented by the exhortations and encouragements of one who must be considered the foremost of Italian patriots, Giuseppe Mazzini.

At this crisis the King of Sardinia stepped forward to lead the new movement in the character of a constitutional monarch, and Pope Pius IX. having inaugurated his pontificate with various liberal measures, the prospects of Italian liberty seemed to have suddenly brightened. The Austrians were driven from Lombardy in March, 1848. A provisional government was established. Venice threw off the yoke also, and Daniel Manin was elected head of the newly revived republic there. Charles Albert, king of Sardinia, immediately led his forces to the assistance of the insurgents; but the Austrians soon mustered in great strength, and the command-in-chief was conferred upon one of the ablest soldiers of his age, Marshal Radetzky, a veteran with whom Charles Albert was wholly unable to cope. Even then the united armies of the Italian states might have prevailed against the enemy had not the Pope, alarmed at the progress of the revolutionary spirit which he had helped to evoke, suddenly deserted the national cause.

The Pope was compelled to seek refuge in an undignified flight, and Rome declared itself a republic, proclaiming Mazzini its Dictator. But the Austrian arms soon turned the tide of battle, and after a defeat at Custoza, in 1848, at Novara the Piedmontese were totally ruined (March, 1849), despite of the most energetic valour. Charles Albert, on the evening after the fight, abdicated in favour of his son, Victor Emmanuel, and withdrew with broken heart and blighted hopes to die in a few brief months at Oporto.

Rome still held out under Mazzini and Garibaldi; but the second French Republic, in defiance of its own principles, and out of jealousy of Austria, marched an army into Central Italy, and compelled the Eternal City to surrender. This event was followed by the restoration of the Pope, who returned to Rome on 12th April, 1850, from which time up to the end of 1866 a strong French garrison protected the Papal States.

The revolution was over, and it seemed as if that vision of a united Italy which had once animated the song of Petrarca and the eloquence of Rienzi, could never again be revived. But Count Camillo Benso di Cavour, a statesman of the highest intellect and most resolute purpose, called to the administration of affairs in Piedmont, took advantage of his position to keep alive the hopes of his countrymen, and to build up, stone by stone, the stately structure of their independence. By developing in Piedmont a constitutional government he rallied the more enlightened and moderate Italians of all classes and parties round Victor Emmanuel, and accustomed them to look to him as their future leader. When the Russian War broke out he despatched a contingent to serve with the allied armies in the Crimea, by which means he gave the kingdom of Sardinia a place among the European powers. Meanwhile the other Italian states were wretchedly misgoverned, and the rich gifts of nature neglected by incompetent rulers. A spirit of discontent pervaded all Italy, which was finally fanned into indignant wrath by the atrocious cruelties practised in the dungeons of Naples, and exposed by the eloquent pen of Mr. Gladstone. At length, in 1859, the French emperor, Napoleon III., partly from personal motives and partly from a desire to conciliate the nationalities of Europe, suddenly stepped into the arena as the champion of Italy, and in the great battles of Magenta and Solferino so humbled the Austrians that they were compelled to sue for peace. A treaty was signed at Villafranca by which Austria agreed to surrender Lombardy, still retaining Venice, and consented to the formation of an Italian confederacy under the protection of the Pope, Austria of course to be one of the members. The different states, however, would listen to no such compromise, and Parma, Modena, the *Emilian* provinces, and Tuscany threw off the yoke of their respective rulers, and voluntarily annexed themselves to Sardinia (1860). France annexed Savoy and Nice as payment for her services, thus robbing her friend on the one hand, while she betrayed Venice to the foe on the other.

The southern provinces, though in a state of chronic disorder, still remained under Bourbon rule. Ferdinand II., because of his bombardment of Messina and his street massacres in Naples in 1848, had been nicknamed King Bomba. He died in 1859, and was succeeded by his son Francis II. Garibaldi, already distinguished by his patriotism, courage, and popularity, suddenly invaded Sicily with a small band of intrepid red-shirted followers (May, 1860), roused its inhabitants against the Neapolitan yoke, and drove the royal troops from point to point, until the entire island accepted Victor Emmanuel as king. He then crossed over to the mainland, and with wondrous daring entered Naples, which immediately declared in favour of union with Piedmont, and compelled its sovereign to retreat in hot haste to Gaeta, and from thence to Rome. The Sar-

dinian army meanwhile had entered the Papal territories, and gained several victories, which resulted in the incorporation of Ancona and Umbria with the Piedmontese territories. The tiny republic of San Marino, which has existed as a walled town from before the year 1000 and has ever since maintained its independence, except for a brief papal annexation from 1852 onwards, alone declined the proffered union, and still remains a sovereign state, one of the smallest in the world. Soon afterwards Victor Emmanuel formally declared himself King of Italy, and Cavour addressed himself to the task of consolidating the new kingdom.

In 1862 Garibaldi, in his eager desire to acquire Rome, raised a small body of volunteers, and invaded the Papal States. But the king's government dared not risk a collision with the French army of occupation, and despatched a body of the royal troops to oppose his progress. At Aspromonte his small force was compelled to surrender. He himself was wounded in the ankle. Both the ministry and the king regretted this untoward event, and a general amnesty was immediately proclaimed.

In 1861 Count Cavour died, and Italy lost her most sagacious statesman—a master-mind not to be replaced. In 1864 a convention was signed between Napoleon III. and Victor Emmanuel, by which the withdrawal of the French garrison from Rome commenced in 1865, and was entirely accomplished by the end of 1866. According to one of the conditions in this convention, the capital was changed from Turin to Florence. No doubt the suggestion to abandon all hope of the capital ever being Rome was thereby intended to be given to the Italians. But early in 1866 a war broke out between Austria and Prussia, and on the 19th June Italy also declared war against Austria. The Austrians were routed at Sadowa, and Venetia was surrendered to the Emperor of the French, for him to use as a means of settling peace in the Austrian interest. At the battle of Custoza, on the 24th of June, the Italian army was defeated, and shortly afterwards the navy suffered a similar mortification at Lissa. The French emperor, however, ceded Venice to Italy, 23rd August, an act which was ratified by the Treaty of Vienna, 12th October, 1866. Austria only retained the old possessions of Venice on the Dalmatian coast. On 7th November, Victor Emmanuel made his triumphant entry into the city, amid general enthusiasm and extravagant demonstrations. The only exception to the national sovereignty then consisted in the city of Rome and the narrow dominions of the Holy See. In 1867 a second attempt on the part of Garibaldi to take possession of these, in violation of a treaty between France and Italy, led to the return of the French, by whom the Garibaldians were signally defeated at the battle of Mentana, on 3rd November, and the conquerors remained at Rome and at Civita Vecchia until 1870. Soon after the outbreak of the war between France and Germany in that year, the French army of occupation was obliged to be withdrawn; and when the war was over and Napoleon had fallen, the new French Republic announced to Victor Emmanuel that the convention of 1864 was at an end. The king, whose adherence to his word had gained for him the honourable title of *Il re galantuomo*, now felt free to act. Accordingly the royal army crossed the frontier, and on the 20th September, after a short resistance from the Papal troops, entered Rome by a breach, and was received with popular cheers for King Victor Emmanuel. A plebiscite of the inhabitants of the States of the Church was soon after taken, when they voted almost unanimously for union with the rest of Italy. The Vatican, the Church of Santa Maria Maggiore, and the country seat of the popes at Castel Gandolfo, were reserved to the popes, who in that restricted territory are still sovereign princes. By an absurd fiction the popes have since chosen to consider themselves prisoners; but in reality they are very well off,

and free from those political cares which formerly distracted them. Thus, almost bloodlessly, the grand object of all Italian patriots for the last fifty years was realized; Italy became once more free and united, and that imperial city with which so many glorious traditions of her ancient power and fame are connected was again her capital. Victor Emmanuel, under whom all this had been accomplished, died 9th January, 1878, and was succeeded by his son Humbert (Umberto).

But if it is astonishing that the unity of Italy should have so swiftly become an accomplished fact, still more surprising is the rapid progress which has been made in a very few years in amalgamating divergent aspirations, in introducing stable government, organizing the finances, opening communications, carrying through works of national utility, creating and organizing a vast army and a strong navy, and spreading education among populations whom centuries of misrule had steeped in ignorance the most profound, and whose poverty even yet is terrible to read of. An excellent account of the immediate past is given in Probyn's "Italy from 1815 to 1878" (London, 1885).

ITCH-MITE (*Sarcoptes scabiei*) is a minute parasitic animal belonging to the order ACARIDEA, the cause of the skin disease known as the itch. The female is larger than the male, and is visible to the naked eye. The body is of a rounded shape and studded with hairs. There are four pairs of legs provided with bristles, and the two front pairs terminate in a sucker. The jaws (chelicerae) are strong and nipper-like. Eyes are absent. The parts of the body most likely to be affected by this parasite are the hands and forearms, the lower part of the abdomen, and in children the feet and legs, but no part is free from attack except the skin of the face and scalp in adults, where it never shows itself. The presence of the itch-mite in the skin soon gives rise to intolerable itching, which is always intensified at night, or after the use of warm or stimulating drinks. When the skin is examined closely it displays a series of little lines resembling the marks made by the point of a pen-nib when drawn over the skin without breaking it. At the end of the line small isolated and conical vesicles appear, and the skin is generally marked with spots of blood and small sores caused by scratching. The character of the disease is readily recognized by a practised observer, and it may be placed beyond doubt by the extraction and examination of one of the mites by the microscope. Left to itself the disease may spread over the whole body, and may last for an indefinite period without any serious danger to the health. As it is most frequently the accompaniment of dirt and neglect, it is generally regarded as a disreputable disease, but is so highly infectious that persons of the most cleanly and careful habits may be affected by it. Fortunately it can almost invariably be cured without pain and in a few days by the use of sulphur, which is fatal to the itch-mite when developed. The best method of using this remedy is for the patient to have a warm bath at night, and well rub the skin, after it has been dried, with sulphur ointment mixed with lard. A drachm of sulphur mixed with an ounce of benzoated lard is a good strength for an adult; for children half the quantity of sulphur should be taken. The whole of the body, except the face and head, should be rubbed with the ointment, special attention being given to the parts affected. The underclothing should be worn all night to keep the ointment in contact with the skin, and should be changed for clean clothes after a warm bath in the morning. This should be repeated the next night, and then the ointment should be used only for the affected parts for a week or ten days. The disagreeable smell of the ointment may be obviated by the use of some perfume rubbed up with it. Another remedy is the use of *stavesacre* ointment four times a day for four days. All articles of clothing liable to convey the infection should be disin-

fected by exposure to heat. Underclothing may be boiled, and other garments may be ironed with a hot iron or baked at a temperature of not less than 160° Fahr.

ITINERARY OF ANTONINE (*Antonini Itinerarium*) is the title of a very valuable account of all the great roads and many of the cross roads in the Roman Empire. It was begun under Julius Cæsar and continued under many emperors. It is often believed to derive its name as a complete record from the great Marcus Aurelius (Antoninus), but although he may have caused it to be improved to his date it now seems almost proved that it was under Caracalla (211-217) that it was issued in the form in which we know it. Some commentators think it much later, even as late as Constantine the Great (fourth century). The mileages are given, and the towns, places, and military stations named. The only difficulty of relying altogether with confidence on this admirable work is the paucity of the MSS. known, and their manifest corruptness in many passages. The earliest copy is clearly wrong as to many of the mileages, and this now can hardly be amended either by research or authorized conjecture.

IULUS. See MILLEPEDE.

IVAN is the Russian for John. There have been six sovereigns of Russia with this name.

IVAN I. and **II.** were grand-dukes of Russia, of the princes of Volodimir, father and son ascending in 1328 and 1353 respectively. Ivan I. brought Moscow forward as the capital on account of its central position, and began that system of administrative centralization which lasted down to the time of Peter the Great.

IVAN III., the Great, otherwise the Threatening (1462-1505), was the great enemy of the petty princes his vassals, many of whom were frightened into abdication, while others were permitted to retain their dignities during their life on condition of naming the grand-duke their successor. A few were subdued by force. He was born in 1439, and succeeded his father Vassily II. (the Blind) in 1462. The republic of Novgorod revolted in 1470, and the revolt was suppressed; but on its second outbreak in 1475 Ivan thoroughly subdued it and annexed it to his own dominions. In 1472 he married at Rome the daughter of Constantinos Palaiologos, Byzantine emperor; and through this marriage the Byzantine metal work and painting crept into savage Russia. The antique paintings in gold and the barbaric splendours of the Kremlin resulted. Another result was the inheritance, as Ivan so regarded it, of the two-headed eagle of the Byzantine emperors, on the dying out of the empire with the line of Palaiologos. The eagle, with its perpetual reminder, has floated above the Russian head ever since. Its effect is only too fatally seen from time to time. In 1476 he began to refuse tribute to Ahmed, khan of the Golden Horn, which of course led to the war he expected and was prepared for. In 1481, after several vicissitudes of fortune, Ivan defeated and killed his enemy. The next year he was victorious over the Poles, and later on over the Livonians. The Khan of Khasan submitted to him in 1487. This prince was the first to style himself Czar of all the Russias, though he did not adopt that as a permanent title. His work was not altogether confined to conquest; for it is to him that Russia owes her earliest code, the *Sondebrick*. He died 7th October, 1505, leaving his crown to his younger son Vassily III.

IVAN IV., the Terrible, first Czar of Russia, was the son of the last-named Vassily (*Ivan Vassilivich*), and grandson of Ivan the Great; he succeeded in 1533 as a boy of four years. He amended the *Sondebrick* and founded and organized the *streltzi* or standing army, introduced printing and other civilizing influences when he attained his majority, and burst through the intrigues of the nobles who had misgoverned in his name. He was most victorious as a conqueror. He annexed Khasan in

1552, Astrakhan and Crim-Tartary in 1554, and destroyed the Teutonic order, seizing most of their territory, in 1561. But in the midst of these glories his wife, Anastasia Romanoff, to whom he was much attached, died 1563. His whole nature changed; he became a suspicious, ruthless tyrant; probably, in truth, a madman. His hand lay heavy on the boyars or nobles; anyone who crossed him was sent to the scaffold or the mines; even towns which offended him he treated as if they were nests of traitors, slaughtering their citizens by thousands, as at Novgorod in 1570, at Moscow, &c. Attacked by both Swedes and Poles in 1581 he asked the intervention of Gregory XIII., who procured a truce of ten years. He died in 1584. The utter feebleness of his son Feodor carries out the suggestion made above that Ivan Vassilivich was actually insane in the latter part of his life.

IVAN V., Czar of Russia (*Ivan Alezeiovich*), born in 1663, nominally succeeded his brother Theodore in 1682 as joint-ruler with his half-brother Peter (Peter the Great), who held in reality the whole power. He abdicated in 1689.

IVAN VI., Czar of Russia, born 1740, was named heir by his aunt, the Czarina Anna Ivanovna, daughter of Ivan V., in the year of his birth, the regency being given to Anne's favourite, Biron. Elizabeth, daughter of Peter the Great, deposed him in 1741, and imprisoned him for the rest of his life, and on an attempt to restore him under Catharine II., he was killed 16th July, 1764, by the officers of the garrison of his prison at Schlüsselburg. He was the son of Duke Antony Ulrich of Brunswick-Wolfenbüttel, by the Grand-duchess Anna Carlovna.

IVES, ST., is a municipal borough of England, in the county of Cornwall, on the northern coast, about 10 miles N.N.E. from Penzance and 321 miles from London by the Great Western Railway. It is picturesquely situated on a bay of the same name in the Bristol Channel. The streets are generally narrow and uneven, and the town has by no means a clean appearance. The church is spacious and has a lofty tower. It stands near the beach, and in very rough weather its walls are washed by the sea. There are several dissenting chapels, a town-hall, and literary institution. The harbour is protected by a pier, built by Smeaton in 1770, and by a breakwater completed in 1869. The chief business is connected with the pilchard fishery, of which St. Ives is the headquarters, and with the export of tin and copper, there being some very extensive mines of both metals in the vicinity. The borough is governed by four aldermen and twelve councillors. The population in 1881 was 8809. St. Ives returned two members prior to 1832, and one from 1832 to 1885. The ancient names of the town were *Pendinas* and *Porth Ta*, from Ta, a female Irish saint of the fifth century, or perhaps from a still earlier bishop, Ivo or Ive. It enjoys the curious distinction (in Cornwall) of having taken the side of the Parliament during the Great Rebellion.

IVES, ST., a town of England, in the county of Huntingdon, 5 miles east by south from Huntingdon, and 72 from London by the Great Eastern Railway. The town stands on a slope; the lower part, close on the bank of the Ouse, which is here crossed by a bridge of six arches, is liable to be inundated by the floods of that river. Brewing and malting are carried on, but there are no manufactures. Considerable business is done by means of the navigation of the Ouse. A corn exchange was erected in 1864. In addition to corn, a considerable trade is done in cattle. The church is a light neat building, with some ancient portions, and there are several dissenting chapels. Cromwell was a resident farmer at St. Ives, and acquired the popular title of Lord of the Fens from some displays of public spirit relative to their improvement. The population in 1881 was 3002.

IVI'ÇA, IVIZA, or IBIZA, an island in the Mediterranean, forming one of the Balearic group, belonging to

Spain, 50 miles east by north of Cape Nao in Valencia, and 42 miles south-west of Majorca. It is of an irregular five-sided figure; its length from north-east to south-west being 27 miles, and its average breadth 15 miles. It is varied with hills and valleys, has a mild climate, fertile soil, and abounds in game and fish. Olives and salt are the chief productions.

Iviza is the largest of two islands called by Strabo *I'tyusæ*, or the pine-bearing islands, and was early occupied by Phœnicians and Carthaginians, whence it has been called *Ebosus I'phnissa* by Silius Italicus (*Pun.*, lib. iii. 1, 362). It was taken from them by Q. Metellus, and remained subject to the Romans and their successors the Vandals till the conquest of Spain by the Moors in the eighth century. The Spaniards took the island in 1294, and attached it to the kingdom of Aragon, since which it has usually followed the fortunes of the larger islands Majorca and Minorca. In 1706, during the war of the succession, it submitted to Sir John Leake with a British squadron, and was ceded to England, together with Minorca, at the peace of Utrecht. These continued in the possession of the British till the peace of 1814, when they were restored to Spain.

IVORY, the name given to the largely-developed tooth substance of animals like the elephant, hippopotamus, walrus, narwhal, and the extinct mammoth, and which is largely used in the arts in the manufacture of objects for use or ornament. The trade in ivory is one of very great antiquity, and it seems to have been used for ornamental purposes from the earliest periods. Useful articles made from this material were found by Dr. Schliemann in his excavations on the supposed site of Troy, and ornamental carvings in ivory have been found in the ruins of Nineveh for which the date of 900 B.C. has been assigned. In the Old Testament it is several times referred to as an article of value, and is included among the imports of Solomon. By the ancient Greeks it was esteemed very highly, and some of the most celebrated statues of Pheidias, Praxiteles, and others were constructed so as to present an outer facing of ivory, the Olympian "Zeus" of Pheidias being the most famous. By the ancient Romans it was also used extensively, and it has ever been greatly valued throughout the East.

In the present day the ivory of commerce is derived from the tusks of the African and Asiatic elephants, the fossil tusks of the mammoth, and in much smaller quantities from the molar teeth of the elephant, the tusks of the hippopotamus, walrus, and narwhal, and the teeth of sperm whales. The finest quality is the African, which has a closer grain and preserves its whiteness better than the Asiatic, and this forms by far the larger portion of that which is brought to the European market. It is the most valuable article of commerce in Central Africa, and it has been estimated that over 50,000 elephants must be slaughtered annually to produce the amount exported. The Asiatic ivory, though very white when freshly cut, has a tendency to turn yellow on exposure to the air. The ivory obtained in Siberia from the tusks of the great prehistoric elephant is of a very inferior character, being generally dry and brittle, but it is said to supply the whole of the Russian market, and a portion of it is exported to Great Britain and elsewhere.

Ivory is used largely in England for knife handles, combs, paper knives, the backs of hair brushes, measuring rules, mathematical scales, the handles of walking-sticks and umbrellas, pianoforte keys, billiard balls, and a variety of other purposes. The quantity imported varies greatly from year to year, and as the demand is greater than the supply it is constantly rising in price. In 1879 African ivory was worth about £600 a ton; in 1885 it was selling at £1200. The quality of the tusks varies greatly, and those of large size are proportionately higher in value than the small, those

below 6 or 7 lbs. being worth less than half the price per pound of large tusks. A single tusk of the finest African ivory will sometimes weigh from 120 to 140 lbs. Ivory carving was an important art in the middle ages, beautiful specimens of that period being preserved in museums and churches. The beauty of the material has attracted the attention during late years of some artists of high rank, and some very beautiful and valuable works have been produced in it. The Chinese are very ingenious in working and carving ivory, their concentric balls, ivory boxes, and chessmen being monuments of patient labour and skill. The Hindus also produce some exquisite work in carved ivory, and some of the articles presented to the Prince of Wales during his visit, and afterwards exhibited at London and Paris, were of a very elaborate and delicate character. The principal seat of ivory carving and working in Europe is at Dieppe.

IVORY BLACK, a fine transparent, deep-black pigment, very valuable to the artist. It is brown-black in tint, not blue-black. A common variety made from bone (bone-black) is less intense and browner in tint. True ivory black is made by heating shavings of ivory in an iron cylinder till they become carbonized by destructive distillation.

IVORY COAST. See GUINEA.

IVORY GATE, the famous gate of dreams in classical mythology. Through it passed the visions of mere fancy as they ascended from Hades; but real apparitions passed to the upper world on their temporary visits through the gate of horn. Thus Virgil makes Æneas return through the ivory gate from Hades after his famous visit, gently indicating therefore that he was not relating a religious tradition in recounting that submundane journey of his hero, but was giving the reins to his poetic imagination—

“Sunt gemine somni porte, quarum altera fertur
Cornea, quæ vera facilis datur exitus umbris;
Alterâ, candenti perfecta nitens elephanto,
Sed falsa ad cælum mittunt insomnia Manes.”

—Æneid, vi. 893-6.

IVORY PALM and VEGETABLE IVORY. This is a native of Northern Peru, Ecuador, and Colombia. It grows in groves by itself in damp places, ranging from sea-level to an elevation of 3000 feet. The trunk is often 20 feet long, but partly creeps along the ground, and never rises to a greater height than 6 feet. Ten to twenty leaves spring from the crown; they are feather-shaped, and 18 to 20 feet long. The flowers are diocious, clustered on simple spadices, and surrounded by three or four spathes. The stamens are numerous and are without pollen in the fertile flowers. The ovary has six to nine cells, each cell containing one ovule, and ripens into a drupe, inclosing six to nine seeds. Six or seven of these drupes hang together in a cluster as big as a man's head, and often weighing 25 lbs. This fruit is covered with woody protuberances, and is called by the Spaniards Cabeza de Negro (negro's head), while the seeds are known as Marfil vegetal (vegetable ivory), and the tree itself as Palma de marfil (ivory palm). The seed at first contains a clear, insipid fluid, with which travellers allay their thirst; afterwards this same liquor becomes milky and sweet, and it changes its taste by degrees as it acquires solidity, until at last it is almost as hard as ivory (Seemann). This vegetable ivory is used by turners for small toys, the tops of walking-sticks, &c. The ivory palm is known to botanists as *Phyltelephas macrocarpa* (Gr. *phuton*, a plant; *elephas*, an elephant). There are two other species. They belong to the tribe *Areceæ* among the *PALMÆ*.

IVY. The Old English word *ifig* for ivy, the German *epheu*, Latin *apium*, and Greek *apion*, show that the ivy was a well-known plant to our Aryan forefathers. The Common Ivy (*Hedera helix*) is a native of Europe, and is

found wild in the British Isles. The stem climbs over rocks, trees, and ruins by means of roots, which merely clasp the support, and do not extract the sap of trees like those of the mistletoe. The leaves are three- or five-lobed in the climbing state, but when the stem has reached a point where it can climb no longer, the leaves lose the sharp points, the clasping roots are not produced, and flowers appear. The ivy belongs to the order *ARALIACEÆ*, which is closely allied to the *UMBELLIFERÆ*, agreeing with it in the arrangement of the flowers in umbels. In *Hedera* there are five to ten styles, connivent or combined into one. The fruit is a five-celled berry, containing five seeds, and is crowned with the calyx. The African Ivy (*Hedera canariensis*) has large leaves of a rich green colour, and the star-shaped hairs on the calyx and pedicel have fifteen rays, whereas those of the common ivy have only six rays. This is sometimes called Irish ivy. The Asiatic Ivy (*Hedera colchica*) has very large three-lobed leaves of a deep green colour, and yellowish two-lobed scales on the calyx and pedicels. Ivy sometimes grows as a small tree with a trunk of some thickness. It should be cleared away from the trunks of trees which are valuable as timber, or for their beauty or historical associations, as it will eventually smother them. In the case of buildings no harm need be dreaded, unless there are open cracks or fissures where the stems can penetrate, and by their enlargement increase the opening and still further weaken the structure.

IXIA is a genus of bulbous plants belonging to the order *IRIDÆÆ*. There are twenty-five species, all natives of South Africa, and many of them are in cultivation in our gardens. The flowers are large and showy, and vary considerably in colour. *Ixia viridiflora* has sea-green flowers with black markings at the base of the segments; this species was introduced in 1780. Earlier than this, in 1757, the following were introduced:—*Ixia conica*, with orange flowers; *Ixia erecta*, white; and *Ixia flexuosa*, pink. *Ixia monadelphæ* has blue and *Ixia maculata* white-brown flowers. They should be grown in a mixture of sandy loam and decayed leaves or peat soil. Most of them will grow well in the open air, if planted near a wall in a south border.

The following are the characteristics of the genus:—The perianth is salver-shaped; the stamens are fixed at the throat of the perianth; the ovary is three-celled with numerous ovules; the style branches are linear, recurved, undivided; the bulb or corm is covered with scales; the spathes are short and broad, each inclosing one flower, and sessile along a terminal peduncle or short erect branches.

IXION, a personage of the classical mythology, was a son of Arès, or some poets have made him the son of Phlegyas. He married Dia, daughter of Deioneus, having promised many valuable gifts to his father-in-law. These he afterwards found himself unable to pay, whereupon Deioneus, incensed, came to upbraid him. Ixion offered him a banquet, but as he sat down to it he fell into a concealed pit prepared beforehand, and full of fire. This hateful murder brought Ixion under the wrath of the gods, and he was smitten with frenzy. Zeus at last took compassion upon him, and purified him of the murder, taking him to Olympus for that purpose. Here Ixion saw Hêra, wife of Zeus and queen of heaven. He dared to persecute her with addresses, and she, to prevent Zeus from jealous suspicions, withdrew as Ixion approached, leaving a cloud in her shape. This was the origin of the Centaurs. Ixion boasted of the favour of Hêra, and thus called upon himself the anger of Zeus, who punished his audacity by binding him hand and foot to a perpetually revolving wheel.

IXORA, a genus of plants belonging to the order *RUBIACEÆ*. The species are numerous (about 100), and chiefly confined to India, the Malayan Archipelago, and Africa. They form shrubs or small trees. The flowers

are in terminal corymbs, are usually red, but sometimes white, and are generally highly ornamental, whence several are cultivated in our hothouses, where they require to be kept in a moist heat. *Izora coccinea* was introduced from

the Moluccas in 1690. The corolla in this genus is salver-shaped, with four stamens inserted at the throat and protruding a short distance. The fruit is fleshy, inclosing two stones, each with one seed.

J

J in the English language has a sibilant sound, closely connected with that of the syllable *di* before a vowel, and also represented by the letters *dj* combined, as in *judge*, *edge*. It has a similar, though not the same, sound in the French tongue; but in German it is pronounced like our *y* before a vowel. Though it is generally said that its power with the Romans was the same as with the Germans, there is reason for thinking that our own sound of the letter was not unknown to the ancient inhabitants of Italy. The name of Jupiter was undoubtedly written originally *Diupiter*, so Janus was at first *Dianus*, just as the goddess Diana was called by the rustics *Jana*. [See the articles *D* and *I*.] The argument might be strengthened by comparing the Latin *jungo* with the Greek *zeugnumi*, Jupiter with *Zeus pater*, &c., and also by comparing the Latin *jugum*, *juvare*, *juvencus* with the modern Italian forms *giogo*, *giovare*, *giovenco*, &c. Two pronunciations may have coexisted in the same country. As to the form of the letter *j*, it is of recent date. There is no such character in the Latin alphabet. It arose from the caprice of monkish scribes in varying the letter in the first place, as with the apothecaries, who write *vij*. for seven, *viii*. for eight, &c. Then about the fifteenth century the sign *i* was lengthened below the line when it meant *j*, and finally curved at the end. The capital *J* remained for both sounds for long after. Indeed, the capital *J*, imitated from the small letter, is of comparatively recent date. In the Spanish language *j* represents a guttural, and is now used instead of *x*, which had the same power; thus *Jeres*, rather than *Xeres*, is the name of the town which gives its title to the wine called by us sherry. For the changes which *j* may undergo, or from which the *j*-sound results, see the articles *D*, *G*, and *I*.

JABALPUR (*Jubbulpore*), a town in the Central Provinces, British India, is situated in a rocky basin, at an elevation above sea-level of about 1458 feet, 165 miles north-east from Nagpur. The numerous gorges in the surrounding rocks have been taken advantage of to surround the town with a series of lakes which, shaded by fine trees and bordered by fantastic crags and massy boulders, add much beauty to the suburbs. The town itself is modern, and laid out in wide and regular streets. The principal approach lies near a public garden, containing a fine tank surrounded by groups of temples. Though the climate is mild, a swampy hollow beneath renders the site unhealthy for Europeans. Jabalpur contains a school of industry, in which is one of the largest manufactories of tents and carpets in India.

The railway system has immensely developed the trade of Jabalpur, which has now become one of the most important centres of commerce in the Central Provinces. It is the junction of the Great Indian Peninsular and East Indian systems. The population is 60,000—all Hindus.

JABIRU is the name given to several species of large wading birds belonging to the stork family (*Ciconiidae*). The species to which the name is principally applied is the American Jabiru (*Mycteria americana*), which extends from Mexico southwards as far as Buenos Ayres. The bill is long, conical, robust, compressed, and pointed; the lower mandible is thick and slightly upturned. The jabiru stands nearly 5 feet high. The head and neck are bare of

feathers, and of a black colour, except the lower part of the neck, which is bright red. The plumage is snowy white. The bill is black. The two other birds called jabirus are now distinguished generically from one another and from the American jabiru. The Senegal Jabiru (*Ephippiorhynchus senegalensis*, fig. 2 in *Plates GRALLÆ*) is distinguished by the peculiar shape of its bill, which is curved upwards at the tip. It is smaller than the preceding species, and has its head and neck covered with feathers. It is a native of West Africa. The Australian Jabiru (*Xenorhynchus australis*) has also feathers on its head and neck. It is found in Australia and India, but the Indian form is sometimes specifically separated under the name *Xenorhynchus indicus*. All these birds agree in their habits with the storks.

JACAMAR is the name given to a species of the family of birds Galbulidae, which belongs to the order VOLITORES. The jacamars are distinguished by having a long, slender, straight, or slightly curved and pointed bill, a long graduated tail, short tarsi, and the toes arranged in two pairs, the anterior toes being united. They are all small but brilliant birds, and inhabit the tropical parts of the western hemisphere.

The Green Jacamar (*Calbula viridis*) is an inhabitant of Brazil and Guiana, where it dwells in the recesses of the forest and passes its life in solitude. It feeds entirely upon insects, which it pursues with a short but rapid flight, then it returns to its perch and sits there motionless for some time, when it makes another dart at its insect prey. The eggs are deposited in a hole of a tree. This bird is about 8 inches in length, and is very brilliant in its appearance, the whole upper surface of the body being of a beautiful golden-green colour, the breast yellow, traversed by a broad band of golden green, and the belly reddish. Eight other species of the genus *Calbula* have been described.

The Three-toed Jacamar (*Jacamara cyon tridactyla*) differs from the other jacamars in possessing only three toes—two in front, united to each other, and one behind. It is of a dull green colour above, with the forehead and crown of the head reddish-white; the throat and cheeks are black, and from the throat a black streak descends along the sides of the body to the lower tail-coverts, which with the vent are also black; the rest of the lower surface of the body is reddish-white. This curiously marked bird is a native of Brazil. Its habits agree with those of the other species.

The Great Jacamar (*Jacamerope grandis*, figured in Plate II. BIRDS) has the bill rather stout, and slightly curved throughout its whole length. It is about 11 inches in length. The plumage of the whole upper surface is of a rich and brilliant golden green, exhibiting a more or less reddish lustre in certain lights; the quill-feathers of the wings are blackish externally, and the lower surface is red. The bill is black.

JACANA (*Parridae*) is a family of wading birds (*GRALLÆ*). The jacanas are noted for their short bills, thickened and advanced at the base, and their long and slender toes, armed with extremely long straight claws. The wings are provided with spurs at the bend. They are found in the tropical regions both of the Old and New

World, frequenting the marshes and rivers. Their food is chiefly vegetable. Four genera are recognized as belonging to this family. The typical genus *Parra* is confined to South America.

The Common Jacana (*Parra jacana*) is about 10 inches in length. At the base of the bill there is a large dilated plate standing up in front of the forehead, and a sort of wattle-like prominence occupies the base of the lower mandible; the head and lower surface are black, and the upper parts chestnut. The common jacana is a native of Brazil and the West Indies. It frequents the Amazon and other rivers in that region, where it may often be seen walking on the enormous leaves of the *Victoria regia* and other water-plants.

The Chinese Jacana (*Hydrophasianus sinensis*) is destitute of the frontal plate. It has a long flowing tail, and the tips of the first and fourth primaries are provided with peculiar filamentous appendages. Another species of this genus, *Hydrophasianus chirurgus*, inhabits India and Ceylon. It constructs a large floating nest of dried pieces of grass or of rice-stalks; the eggs are from four to seven in number, of a deep olive-brown colour. Other species of jacanas are found in Africa, Madagascar, and Australia.

JACARE. See ALLIGATOR.

JACK is a substitute for John in England, so that a man named John is familiarly termed *Jack*. But the usage is very remarkable, for it sanctions the use of one name for another. Jack has nothing whatever to do with John. It is the French *Jacques* (our James being derived from another form of the old French *Jacquemes*), the Greek *Jakobos*, and the Hebrew *Ya'ako'b*, or Jacob, he who seizes by the heel, i.e. supplants, from the Hebrew verb 'aq'ab. From this source come Jacob, James, and Jack; and although *Jacques* in France was to the full as common as Jack in England (so that the rising of the common folk was called a *Jacquerie*, &c.), yet it stood for itself as an independent name, and never was used as a second and familiar form of another and more honoured name, as was the unhappy fate of Jack. Owing to this lowering of Jack's value to a cheap and undignified familiarity, it came to be the name given to a variety of persons and objects. Our forefathers loved a personal name, and sparrows were always Philip, cats Tom or Tabitha (Tabby), asses Ned, Jack, or Jenny, goats Billy or Nanny, &c. So also with men: the merry-andrew was a Jack-pudding; the philosopher, a Jack-o'-dreams; the monkeyified whipster, a Jack-sauce or Jack-o'-apes—that is, with an *n* inserted, a Jackanapes; the fool, though usually Tom-fool, was sometimes (but never now) Jack-fool; the common hack workman was a Jack-of-all-trades, usually with the addition "and master of none;" the insolent official was a Jack-in-office; the common sailor was a Jack-tar, since his hands were often tarry with handling tarred ropes; the time-server was Jack-of-both-sides; the costermonger was cheap Jack; and the hangman, Jack Ketch, &c. Then we get Jack Frost, Jack (knaave) of a card-suit, Jack Sprat for a starveling, a little thin thing of a man, &c. The males of many animals are also Jacks: jack-ass, jack-fox, jack-hare, jack-rat, jack-rabbit, &c. Common and useful machines or appliances also have the name, as the jack (whether smoke-jack or bottle-jack) which turns our roasting joints, the jack of the harpsichord (now called "hopper" in the pianoforte), the jack which lifts our heavy weights by its powerful use of the inclined plane (screw-jack), the humble jack which draws off our boots (boot-jack), the jack-boot, the rough boot for all weathers of the seventeenth century; the jack-plane of the ordinary carpenter, not the moulding plane, nor the smoothing plane, nor the trying plane—the mere plane of all work, &c. Many of these jacks still bear their name; the list might readily be extended to thrice its size if obsolete *Jacks* had been included.

JACK or JACA-TREE. See BREAD-FRUIT.

JACK'AL (*Canis aureus*) is a wild species of the dog tribe (CANIDÆ), intermediate in some respects between the wolf and the fox. The jackal is much smaller than the wolf, standing about 17 inches high at the shoulder, and measuring 30 inches in length. It is yellowish-gray above, whitish below; the thighs and legs are yellow; the ears are ruddy; the muzzle is very pointed; the tail is of moderate length, and ends in a darkish tuft. The colours sometimes vary, and the back and sides are described as of mixed gray and black, and as abruptly and strikingly distinguished from the deep and uniform tawny of the shoulders, haunches, and legs. The head is nearly of the same mixed shade as the upper surface of the body. The odour of the jackal is very offensive, but it appears to wear off in the domesticated animal. The matter which gives rise to the disagreeable smell is secreted by a gland at the base of the tail. The pupil of the eye is circular, as in the dog and wolf.

The habits of the jackals are nocturnal and gregarious; they hunt in packs, and are the pests of the countries where they are found, and where they burrow in the earth. In their huntings the jackals will frequently attack the larger quadrupeds, but the smaller animals and poultry are their most frequent prey. Their cry is very peculiar and piercing. The united cry of a pack produces a most unearthly sound, which has been compared to the distant rolling of thunder. These animals are said to devour the dead on the battlefield, and to scratch away the earth from the shallow graves in order to feed on the corpses. The story of the jackal being the lion's provider may have arisen from the notion that the yell of the pack gives notice to the lion that prey is on foot, or from the jackal being seen to feed on the remnants of the lion's quarry. Jackals are capable of domestication; and it is very probable that some of the domestic varieties of dogs are of jackal parentage. The common jackal is found in India and Ceylon, Persia and Asia Minor, and Africa north of the Sahara. The Black-backed Jackal (*Canis mesomelas*), which is found in Africa south of the Sahara, is considered to be a distinct species; it is light red with a black stripe on the back, and is larger than the common jackal. Another variety of jackal, often separated specifically, is the Jackal of Senegal (*Canis anthus*); this animal is large with long slender limbs, and is said to be completely nocturnal.

JACK-A-LANTERN. See IGNIS FATUUS.

JACK'ASS, LAUGHING (*Dacelo gigantea*) is the largest species of the KINGFISHERS (Alcedinidæ). This bird, which is an inhabitant of the Australian bush, gets its name from its peculiar appearance and singular note: the latter is well described in the "Bush Wanderings of a Naturalist":—"About an hour before sunrise the bushman is awakened by the most discordant sounds, as if a troop of fiends were shouting, whooping, and laughing around him in one wild chorus: this is the morning song of the 'laughing jackass,' warning his feathered mates that day-break is at hand. At noon the same wild cry is heard, and as the sun sinks into the west it again rings through the forest." The laughing jackass has a long, stout, pointed bill. The head is large, and covered with a sort of crest of longish feathers, which are dark brown on the crown of the head and pale buff on the sides. A broad dark brown band passes from the base of the bill round the back of the head, and the back is dark brown. The back of the neck is pale buff; the whole lower surface white; the wings, crests, and rump greenish-blue and black; the quill feathers of the wing black, with a white spot near the outer margin of the wing; and the tail is chestnut-brown, banded with black, and with the extreme tip, the margins of the outer feathers, and a band before the tip white. The upper mandible is blackish-brown, the lower one pale buff.

The laughing jackass is by no means a shy bird; it is

generally seen in pairs. From its habit of destroying snakes it is regarded by the bushman with affection. Whether it eats the snakes which it kills is uncertain, but its food chiefly consists of large insects and their larvae, lizards, and even small mammals. It breeds in August and September, depositing its eggs, which are of a beautiful



Laughing Jackass (*Dacelo gigantea*).

pearl white colour, in a hole in some large gum-tree, upon the dust and decomposed wood which lines the bottom. It defends its nest and young with great courage, and its formidable bill enables it to inflict very severe wounds. Several other species of the genus *Dacelo* are found in Australia.

JACK'DAW (*Corvus monedula*) is a species of Crow smaller than the rook or carrion-crow, being about 13 inches in length. The jackdaw resembles the rook in living together sociably in considerable flocks throughout the year. It is a common inhabitant of Britain, and also of the continent of Europe, extending southward to the northern shores of Africa, and eastward at least as far as Lake Baikal in Central Asia. The jackdaw is a bold and familiar bird, generally inhabiting cultivated and well-peopled districts, and frequenting especially the towers and belfries of churches and similar elevated buildings, among the nooks and crannies of which it builds its nest and brings up its young. In more rural districts and on the coast the jackdaw builds in the cavities of rocks, cliffs, and quarries, and also in chimneys, which are sometimes quite stopped by the quantity of materials brought in to form the nest. It has also been known to breed in a hollow tree. The nest is composed of a great mass of sticks lined with wool and other soft substances, and the quantity of materials brought together is sometimes enormous. The eggs vary in number from four to seven; they are bluish in colour, blotched and spotted with brown. The jackdaw is of a black colour above, with purplish wings and tail; the back and sides of the neck are of a sooty-gray colour; the lower surface is rusty black, and the crown of the head glossy blue-black. The bill and feet are black, and the irides white. Like the larger crows, it is by no means particular in its diet, feeding indiscriminately on grain, fruit, insects, or carrion; and when it inhabits the coast, on shell-fish, crustacean, and dead animal matters thrown up by the waves. Young jackdaws taken from the nest are easily tamed, and their cleverness makes them favourite pets. They possess considerable powers of mimicry, and may even be made to speak.

JACKSON, ANDREW, President of the United States of North America, was descended from a Scottish family which had settled in Ireland, whence his father, Andrew Jackson, with a wife and two sons, emigrated in 1765 to South Carolina, where his third and youngest son, Andrew, was born, 15th March, 1767. The father died soon afterwards. Andrew appears to have been his mother's favourite, and his original destination was to be a clergyman. With this view he studied theology for some years; but when the War of Independence commenced the young Jacksons did not hold back. Andrew is recorded to have fought when little more than thirteen, and from this time he shared in every campaign as long as the war lasted. In 1784 he placed himself under an advocate to be instructed in the law. This new study he prosecuted with so much success, that in 1787 he was appointed solicitor for what was then called the Western District of North Carolina, and is now the state of Tennessee; but he did not entirely throw off his military character, and he served with distinction, though only as a private, against the Indians, who had become troublesome to the state.

Having acted as one of the members of the convention for establishing a constitution for the state of Tennessee, he was, in 1796, elected to a seat in the House of Representatives. The next year he was chosen a senator, but resigned his seat after holding it for one session, and was nominated by the legislature of Tennessee a judge of the Supreme Court in that state, having also been shortly before appointed a major-general of the state forces. He resigned his judicial office, and lived in retirement on a farm a few miles from Nashville, on the Cumberland River, till the breaking out of the war with England in 1812. His first command was that of a body of between 2000 and 3000 volunteers, with whom he proceeded down the Mississippi for the defence of the lower country in November, 1812. The next year he greatly distinguished himself by a campaign against the Creek tribes. It was during this campaign he set an example of endurance to his men, by living on hickory nuts at a time when supplies were scarce, and gained for himself his popular sobriquet of "Old Hickory." In 1814 Jackson was appointed a major-general in the service of the United States. He captured Pensacola on 7th November, and raised himself to the highest point of reputation and popularity among his countrymen by the famous repulse of the British forces in their attack on New Orleans, 8th January, 1815. The next military command which he held was in the war against the Seminole Indians of Florida in 1818.

General Jackson was commissioner on the part of the United States in the negotiation with Spain for the transference of Florida; and after the arrangement he was, in 1821, appointed the first governor of the province. He held this post for a year, and was then again elected a member of the senate for the state of Tennessee. When the election of a new president took place at the end of 1824, General Jackson was a candidate along with Mr. Adams, Mr. Clay, and Mr. Crawford. Mr. Adams became president on this occasion, but General Jackson was elected in 1828, and again in 1832; so that he was at the head of the government of his native country for the eight years from 1829 to 1837. The most important events of his presidency were his suppression of the United States Bank, the introduction of a specie currency in the place of paper, and the organization of his party on the base of public patronage. In the last-named respect he has been followed by his successors of both parties, and the practice has exercised a very baneful influence over political life in the United States. General Jackson survived his presidency about eight years, and died at his seat called the Hermitage, near Nashville, in Tennessee, on the 8th of June, 1845.

JACKSON, THOMAS JONATHAN, more commonly known as *Stonewall Jackson*, an American general, was born in Harrison county, Virginia, 21st January, 1824. He was educated at the military academy of West Point, was breveted second lieutenant in the 1st corps of the artillery of the United States in 1846, and served with distinction during the war in Mexico. After the war he resigned his commission, and was elected professor of mathematics and military science in the Virginia Military Institute at Lexington. On the outbreak of the Civil War he was commissioned colonel of infantry in the Confederate army, and soon afterwards was made brigadier-general. The firmness of his brigade at the battle of Bull Run, 21st July, 1861, earned for him his name of "Stonewall." During the campaign he displayed military capacity of the highest order, and gained numerous important victories, while his personal bravery and great tactical skill made him the idol of his own soldiers. He died of wounds received from his own men, who fired upon him in the dark through a mistake at the battle of Chancellorsville, 10th May, 1863.

JACKSON, WILLIAM, an excellent musician in his time, was born in 1730, at Exeter, of which place his father was a respectable tradesman. He was placed under the tuition of the organist of the cathedral, and completed his studies in London, under the celebrated Travers, of the Chapel-Royal. He returned to and settled in his native city, and in 1777 was appointed sub-chantor, organist, lay-vicar, and master of the choristers of the cathedral. He died in 1803.

Jackson first made himself known as a composer by the publication of "Twelve Songs," which immediately spread his fame throughout the kingdom. His reputation was maintained by many other works. His "Twelve Canzonets for Two Voices" were once the delight of every musical circle. Of these, "Time has not thinned my flowing hair," and "Love in thine eyes for ever plays," have lost none of their charms. Of three dramatic compositions, "The Lord of the Manor" alone survives. His service in F, especially the Te Deum, is still a great favourite in country churches.

JACOBI, FRIEDRICH HEINRICH, a German philosopher, was born at Düsseldorf, 25th January, 1743. His father, who was a wealthy merchant, caused him to be educated for a commercial career, but his own inclination was in favour of a life of study, and being possessed of ample means he was enabled to devote himself to literary pursuits. He married a young lady of fortune in 1763. In 1770 he was appointed member of the council for the duchies of Julich and Berg. In 1779 he published his first important work, a philosophical romance entitled "Waldemar." This was followed in 1781 by his "All-will," a work of a similar character, and in 1785 there appeared his "Letters on Spinoza's Theory," in which he maintained successfully a controversy with Moses Mendelssohn, and expounded his own strong objections to any demonstrative system of philosophy. He followed up his work in this direction by the publication of a work on David Hume's theory of belief, in 1787, and in this production he endeavoured to explain and defend his own theory of *glaube* or faith. In 1804 he settled in Munich, and in 1807 he became president of the academy there. He had been for some years engaged in a controversy with the followers of Kant, and in 1799 had addressed a controversial letter to Fichte; and in 1811 he published a treatise "On Divine Things," chiefly directed against Schelling, which called forth a sharp and bitter reply from the latter. Jacobi died 10th March, 1819. His writings were published in six volumes by his friend Köppen, the edition being completed in 1825. He was not a systematic thinker, and was distinguished not so much as the author of a peculiar system of philosophy as for the critical ac-

men and forcible eloquence with which he detected and exposed the incoherencies and defects of the existing systems.

JACOBI, KARL GUSTAV JAKOB, one of the greatest mathematicians of the present century, was born at Potsdam, in Prussia, 10th December, 1804, studied at the University of Berlin, and in 1827 became professor of mathematics at Königsberg. He held this office until 1842, when he was compelled to resign on account of failing health. After a journey to Italy he removed to Berlin, where he received a royal pension, which was continued until his death, 18th February, 1851. He was the author of a work entitled "Fundamenta nova Theoriæ Functionum Ellipticarum," which contained the first portion of his researches on the subject of elliptic functions, and was published in 1829; of the "Canon Arithmeticus," published in 1839; and of a long series of papers on the different branches of the higher mathematics, which were published in the celebrated *Journal für reine und angewandte Mathematik* of Crelle.

JACOBINS is the name of a faction which exercised a great influence on the events of the French Revolution. This faction originated in a political club formed at Versailles in 1788, when the parlements or law courts were being closed by royal order throughout France. One deputation sent from Brittany to plead for liberty of holding parlements was thrown into the Bastille; a second was met and turned back on the road by orders of Loménie de Brienne, then premier; a third and very large one was then sent, and established itself permanently at Paris as the Breton Club. It rose, under Lafayette's leadership or patronage, into considerable prominence as a centre of agitation at the meeting of the first National Assembly, and was then still composed chiefly of deputies from Brittany, with some also from the south of France, among whom was Mirabeau. When the National Assembly removed its sittings to Paris (19th October, 1789), the Breton Club followed it, and soon after established their meetings in the suppressed convent of the Jacobins, or Dominican monks, in the Rue St. Honoré. The Dominican friars received the name of Jacobins in France, because their first convent was at Paris in a house in the Rue St. Jacques (*Sanctus Jacobus*), where they established themselves as early as 1219, and made this Jacobin foundation their headquarters for that kingdom. From this circumstance the club and the powerful party which grew from it were known by the name of Jacobins. The club was now so important and so devoid of any decided nationality that its first title, the Breton Club, was manifestly a misnomer. It therefore renamed itself the French Revolutionary Club, and a little later the club of Friends of the Constitution. These names are but little known, however, and the club itself, except officially, adopted the nickname of *Jacobin*. In 1789 it numbered 1300 members. It published its everlasting debates, debates conducted in strict parliamentary style, with platform where once the chair stood, with tribune for the orator elevated midway to the groined roof, and president with hat and bell, nay also with a strangers' gallery always crowded, usually with women plentifully intermixed. The Rue de Rivoli now runs through the site; the St. Honoré market stands upon part of it.

As many as 300 subsidiary societies joined themselves throughout the provinces to this mother society, the *Société Mère* of Paris, and the total number of enrolled members rose to 44,000. Those who thought the mother too gentle had split off under Danton and Desmoulins into a club which, from meeting in another old convent, got the name of the Club of the Cordeliers. Those on the other hand who, while ardent reformers, still clung to the monarchy, had split off in their turn, also to lease a convent from the Assembly, and to be known by its name as the Club of the Feuillans. Lafayette was their chief

leader. During the year 1790 the club increased its numbers, and obtained such influence and power, especially in 1792, as to control the legislature. The attack on the Tuileries in August, 1792, the massacres of the following September, the suppression of royalty, and most of the measures of the Reign of Terror, originated with the Jacobin Club. After the fall of Robespierre in July, 1794, the Convention passed a resolution which forbade all popular assemblies to interfere with the deliberations of the legislature, and the club was finally suppressed the same year.

JACOBITES (from *Jacobus*, the Latin form of James), the name given to the partisans of James II., and after his death to the male line of the house of Stuart. After the final defeat of James in Ireland many of his adherents were compelled to follow him to the French court. Those who remained in Great Britain had to purchase their immunity by a show of submission to the new government. They were strongest in Scotland, and their conspiracies and intrigues kept both countries in a ferment for a long period. The first serious outbreak took place in 1715, and being unsuccessful it entailed severe penalties upon its leaders. A more dangerous rebellion broke out in 1745, and the troops of the Pretender reached as far as Derby on their road to London; but the defeat of Culloden in 1746 was followed by the flight of Prince Charles, and from this time the efforts of his followers became less and less active until they ceased altogether, long before the death of the prince, a broken-down drunkard, in 1788. In England the Jacobites were famous for their high church principles, their dislike to dissent, and their maintenance of the high prerogatives of the crown. They formed the party known also as the Tories in opposition to the Whigs, who adhered to the house of Hanover. In English literature of the first half of the eighteenth century, the references to the opposition of the two parties are very numerous, while in Scotland the Jacobite songs form a distinct and highly prized class of Scottish melodies. They describe in a glowing and spirited manner the somewhat imaginary virtues of the exiled Stuarts, and reflect in a quaintly humorous fashion on the character of the Whigs. Many of them were written long after the cause had been given up as hopeless, and they are still prized for their intrinsic merits, though the sentiment they express has long ceased to exist. In Ireland the Jacobite cause was identified with Roman Catholicism and that of the native Celts, as opposed to Protestantism and the rule of the English colonists. In consequence of this it lasted longer in Ireland than in the neighbouring countries, and the conflicts between the Orangemen, originally supporters of William, prince of Orange, and their opponents, now known under other names, have hardly yet ceased to be troublesome to the authorities.

JACOBITES, a heretical Christian sect, a branch of the Monophysites. They derived their name from Jacobus Baradaeus (Al-Baradei), bishop of Edessa in Syria, who collected them into a well-organized community in the times of Justinian (sixth century). They still exist in Syria, and number about 50,000; two patriarchs govern them, appointed by the Sultan of Turkey.

JACOB'S LADDER is the name given on shipboard to a short rope-ladder fitted with wooden steps or spokes. In breweries it is the name of an endless revolving chain fitted with a series of buckets used for raising malt to the upper parts of the buildings. As the chain is moved the buckets fill themselves at the bottom and empty themselves at the top. In botany it is the name of a perennial plant with large blue flowers, which grows in bushy places in the north of England and south of Scotland, but is more common in the centre and south of Europe.

JACO'BUS, a gold coin of England which derived its name from James I. (*Jacobus primus*), who first coined it. Its value was 25s.

JACOTOT, JEAN JOSEPH, a very original pedagogue, was born of humble parentage at Dijon in 1770. He entered the army, but his abilities came to the knowledge of the First Consul, and he received several high educational government posts, finally being appointed subdirector of the great Polytechnic School (*École Polytechnique*) at the early age of twenty-five. A little later he was professor of the method of sciences at Dijon, where he first attracted great attention. His plan was never to give a flood of information on a subject to the great danger of stifling the pupil's own wish to investigate for himself, but to put forward a simple statement and start it as a quarry for the class to hunt down together with himself. His help was only to keep them on the scent by leading questions. He was afterwards professor of ancient and Oriental languages, of mathematics, and then of Roman law; and he always pursued the same method of teaching, and we are told with uniform success. He retired to Belgium in 1815 upon the restoration of the Bourbons, and in 1818 he was appointed by the Belgian University of Louvain to its chair of French language and literature, and this too without his knowing either Flemish or Dutch. In this emergency he supplied his class with a copy of Fénelon's "Télémaque," with the French on one side and the Dutch on the other. This they learned by heart, comparing the two versions, sentence by sentence. After a while they endeavoured to construct the French original from the Dutch of parts which they had not seen in French as yet, and then this attempt was compared with Fénelon's work. The progress made was astonishingly fast and secure; and from his observations upon the results of this method, which here was perforce rigorously followed, since the teacher was without power of giving direct instruction if he had wished to give it, he deduced certain startling paradoxes. The chief are these:—1, "Every one is equally capable of learning," certainly false without Jacotot's rather laboured commentary upon it; 2, "Every one can teach," also contrary to fact; and still more absurd was the third; 3, "Every one can teach what he does not know himself." Jacotot means by "teach" simply *cause to learn*; giving information is with him not teaching at all. Better is his rule 4, "Learn one thing thoroughly in the subject, and refer everything else to that." Thus in French learn by heart a great part of "Télémaque," for instance, or some other good book, and refer all subsequent French studies to that model. Jacotot returned to France in 1838, and died in 1840.

JACQUARD, JOSEPH-MARIE, was born at Lyons on 7th July, 1752, of humble parents, both of whom were employed in operations connected with weaving. His parents died, leaving him a small property, which he employed in the attempt to establish a business in the weaving of figured fabrics. The undertaking failed, and he was compelled to sell his looms in order to pay his debts. He subsequently married, and occupied himself with ingenious schemes for improvements in weaving, cutlery, and type-founding, which produced nothing for the support of his family. In 1792 he assisted in the defence of Lyons against the army of the Convention. Being denounced after the reduction of Lyons, he was compelled to fly. When he was enabled to return, and his native city began to rise from its ruins, Jacquard applied himself with renewed energy to the perfection of the beautiful apparatus for figured weaving bearing his name. [See WEAVING.] He had conceived the idea of it as early as 1790, and now succeeded, though imperfectly, in accomplishing his end. His machine was presented, in 1801, to the national exposition of the products of industry, the jury of which awarded him a bronze medal for its invention. In the same year he obtained a patent, or brevet d'invention, for a term of ten years.

About this time the attention of Jacquard was acciden-

tally directed to the construction of a machine for weaving nets for fishing and maritime purposes. He accomplished the desired object, but having amused himself and his friends with his contrivance he threw it aside. His machine-made net, however, fell into the hands of the préfet at Lyons, and the result was that, according to the arbitrary fashion of the time, he and his machine were placed under arrest and conveyed to Paris, where the invention was submitted to inspectors, among whom were Napoleon and Carnot, and a gold medal was awarded to him in February, 1804.

In 1804 Jacquard returned to Lyons, where he was long engaged in superintending the introduction of his inventions for figured weaving and for making nets, in which he was powerfully aided by Camille Pernon, a rich manufacturer. For some years Jacquard had to struggle against much opposition and prejudice on the part of the Lyonesse weavers, who conspired to discourage the use of his machinery, and his personal safety was at times endangered. At length, however, the value of the invention was acknowledged, and it was brought very extensively into use, not only in France, but in Switzerland, England, Germany, Italy, and America. It is now, however, being superseded by looms of a more delicate and simple construction.

Jacquard continued to reside at Lyons, where he exerted himself in promoting the use of his great invention until, having lost his wife, he retired to Oullins, a village near Lyons, where he spent his latter years in retirement, and died 7th August, 1834. During his life he received the cross of the Legion of Honour, and in 1840 a public statue was raised to his memory at Lyons.

JACQUELINE DE HAINAULT, Countess of Holland, was born in 1400, and married to Count John of Touraine in 1415. She was already a widow when she succeeded her father in Holland in 1417, and next year married John IV., duke of Brabant. Her title to her county was disputed by her uncle, John of Bavaria, and she was very unhappy with her husband, who deserted her. She made a good defence against her uncle at first, but afterwards was forced to acknowledge him her heir in 1419. Meanwhile her husband was treating with him for the sale of the province, and this sale was actually effected in 1420. Jacqueline was driven out of her lands, and took refuge in England. She got release from her unworthy partner by help of Pope Benedict XIII., and then married our English Duke Humphrey of Gloucester, 1423. Attempting to recover her inheritance she fell into the power of the Duke of Burgundy, 1424, but escaped in a few months to Holland. The good Duke Humphrey died in 1427, and left her again a widow; and she now sought to make her peace by recognizing the Duke of Burgundy as her lieutenant and her heir, 1428. In 1432 she married Franz de Barselm, and soon after acknowledging the marriage gave up her county to the duke. She died, after this curiously chequered life, still a young woman, in October, 1436. The very hard stoneware which bears the name of this much-vexed lady is described under CERAMIC ART, and a specimen is shown in the Plate illustrating that article.

JACQUERIE, derived from the name Jacques Bonhomme, familiarly applied to the rural population of France, is the name given to insurgent risings on the part of the peasantry against the nobility. The most important of these outbreaks was that which broke out in 1358. At this time the condition of France was miserable in the extreme. Civil and foreign wars had sapped its strength, and plague and famine had followed in their train. The French king, John II. the Good, was a prisoner in the hands of the English, civil war raged in France itself, the people of Paris had risen in rebellion, and were striving to establish a free commune, when, in May, 1358, in the neigh-

bourhood of Clermont and Beauvais, the peasantry also rose and commenced a war upon the nobles and gentry. Driven to desperation by hunger and the shameful wrongs they had so long endured, they sought to destroy all their oppressors, and to this end they burnt every castle and feudal house they captured, killing the nobles and their children, and violating their wives and daughters. The insurrection spread like fire among the rural population, and in a few weeks immense mischief was wrought. The nobles, however, made common cause against them; and while besieging Meaux they were on 9th June completely routed by Captal de Buch and Gaston Phœbus, count of Foix. This defeat was followed by the wholesale slaughter of all who could be captured, and the insurrection was completely suppressed, though its results were long remembered. (See Sismondi, vol. x., pp. 530-533.)

JACTITATION, in English law, is the name given to a false pretension to marriage. If a person boasts or falsely asserts that he or she is married to another, the latter may commence a suit in the Probate, Divorce, and Admiralty Division of the High Court of Justice, entitled the Jactitation of Marriage, the object of which is to enforce proof of the averment, and if this is not forthcoming, to obtain a decree enjoining perpetual silence. If such a decree is granted future averment has no legal effect. A similar remedy is provided by the law of Scotland.

JADE, NEPHRITE, or AKESTONE is a massive amorphous silicate of magnesia and lime; it is very hard and tough, and was much used for stone implements both in the Neolithic stone age and by the Polynesians in more modern times. It is of a leek-green or olive-green colour, passing into gray and greenish-white; it is translucent, and has a specific gravity of 3 and hardness of 7. The only known source of jade is in the north of Cashmere, but its wide distribution as stone ornaments and weapons shows that it occurs elsewhere, or that there was considerable commercial intercourse among savage tribes in earlier times. Its occurrence in New Zealand and the Pacific Islands suggests local sources. The name nephrite is derived from the Greek *nephros*, a kidney, as the stone was formerly much worn as an amulet, and supposed to prevent diseases of the kidney.

JAEN, a province of Spain, with an area of 5179 square miles, and 425,000 inhabitants. It is a hilly district, but the soil in the valleys is extremely fertile. The produce is wine, oil, corn, honey, silk, vegetables, and fruits of every kind. The mountains abound with rich pastures; sheep and fine horses are bred in the country.

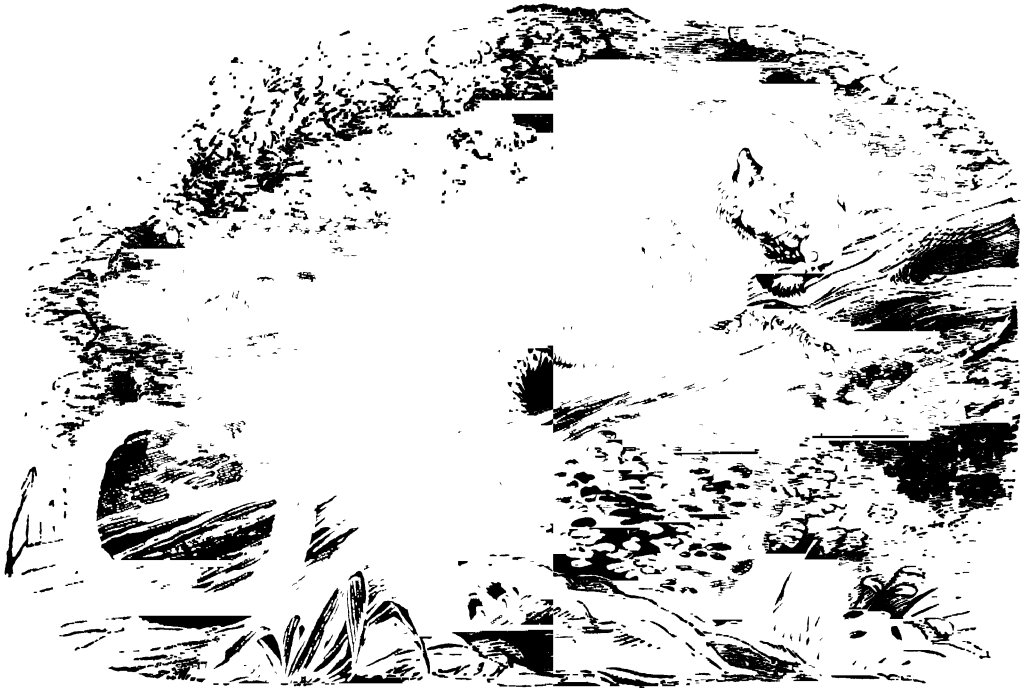
JAEN, the capital of the above province, is an episcopal town, and has a cathedral and 25,000 inhabitants. It is most picturesquely situated, and surrounded by old Moorish walls, surmounted by numerous towers and pinnacles. The town was formerly noted for its silk manufactures, but they have entirely died out, and although situated in the midst of plenty it is now very poor.

JAFFA. See JOPPA.

JAGGERY is the crude brown sugar obtained from the juice of the young flowering shoot of several species of palm. It is yielded chiefly by the Wild Date (*Phoenix silvestris*), the Cocoa-nut Palm (*Cocos nucifera*), the Palmyra Palm (*Borassus flabelliformis*), and the Gomuto Palm (*Arenga saccharifera*). De Vry has advocated the cultivation of these palms to supply sugar in place of the sugar-cane. The juice is a solution of sugar in water with scarcely any other ingredient. Palms therefore do not exhaust the soil as beet-root or sugar-cane, and the processes of extracting the pure sugar, so laborious in other cases, are unnecessary in the preparation of jaggery. The method adopted is to cut the top off from a young flowering shoot (spadix), and tie an earthen vessel to the stump to catch the juice, which continues to flow for some days. If jaggery is left to ferment it becomes the intoxicating drink known as toddy, and this distilled is arrack.

JAGUAR (*Felis onca*) is one of the largest of the cat tribe (*FELIDÆ*), and is often called the American tiger. This formidable animal is larger and more robust and stoutly made than the leopard. The head is larger and rather shorter, and the profile of the forehead more prominent; the limbs are more thick and muscular, and the tail shorter. Specimens of this savage beast have been confounded with the leopard; but the jaguar, besides differing in other points, always displays a bold streak or two of black extending across the chest from shoulder to shoulder. The rosettes on the body are very large, open, and somewhat angular, with a central spot or two of black in each; a chain of black dashes extends along the spine. The

jaguar measures about 4 feet from the nose to the root of the tail, but much larger specimens are often met with. Of all the American *Felidæ* the jaguar is the most formidable. It prefers the wooded and marshy districts of the warmer regions, and is common in Paraguay and Brazil. It extends as far north as the southern regions of the United States. The jaguar climbs with the utmost ease, and chases the monkeys among the branches. It also swims well, crossing broad rivers with ease. Its favourite prey is the capybara. Birds, fish, turtles, peccaries, monkeys, and domestic quadrupeds are also its prey. It seldom voluntarily attacks man; when hard pressed, however, it makes a resolute defence. Both in form and colour the jaguar is



The Jaguar (*Felis onca*).

prone to considerable variation, one of the kinds being of a deep brownish-black hue generally.

JAGUARONDI (*Felis jaguarondi*) is a small species of the cat tribe (*FELIDÆ*), inhabiting the dense forests of South America. The jaguarondi presents some resemblance to a weasel, having a long lithe body and short legs. The head is small and well shaped; the tail is long. The jaguarondi is about 3 feet in length including the tail, and is of a dark grayish-brown colour. It preys upon small mammals and birds.

JAIL FEVER. See GAOL DISTEMPER.

JAINS or **JAIN'AS**, a religious sect of the Hindus, holding an intermediate position between the Brahmans and the Buddhists. They are found in every province of India, but are most numerous in the west and south, where they are principally engaged in commerce, and from their wealth and influence form a very important division of the population of the country. The provinces of Mewar and Marwar appear to be the places where the sect originated, and their present headquarters are Rajputana and Gujerat. The origin and early history of the Jains are among the unsettled questions of Oriental scholarship, and their tenets are as yet but imperfectly understood. According to many

scholars the founder of the system was contemporary with Buddha; but the sect does not seem to have attained to any prominence until the decline of the system of Buddha in the eighth century A.D.

The religious beliefs of the Jains resemble in many important points those of the Buddhists, and like the latter they deny the authority of the Vedas, though they treat them with respect, and disregard the system of caste. They are also opposed to the prevailing idolatry, and deny the power of the gods. They have a great respect for animal life, believe in the transmigration of souls, hope for nirvana, which they interpret differently from the Buddhists, and lay the greatest stress on the four virtues of liberality, gentleness, piety, and repentance. A distinguishing peculiarity of the early followers of this sect was their going about quite naked, and one of the two great divisions of the order is distinguished by the title *Digambara* or sky-clad, the other being called *Svetambara* or white-robed. At the present day, however, it is only the ascetics of the first division who observe this rule, and they confine their disuse of clothes to meal times. They have a series of sacred books dating from the sixth century of the Christian era, some of which are now under process of translation in

the series of the sacred books of the East published at Oxford. (See Colebrooke's "Essays," vol. ii., and Wilson's "Essays," vol. i., for an account of these people and their system of religion.)

JAIPUR (*Jeypore*), a native state in Rajputana, under the political superintendence of the Rajputana Agency and the government of India. It lies between lat. $25^{\circ} 41'$ and $28^{\circ} 27'$ N. and lon. $74^{\circ} 55'$ and $77^{\circ} 15'$ E. The area is 14,465 square miles.

The general character of the country is tolerably level and open, although its surface is crossed and diversified by groups and ranges of hills and by isolated peaks. The centre of the state is an elevated table-land of triangular form, from 1400 to 1600 feet above sea-level, and with a gradual slope to the south-east towards the Banas River.

The general drainage of Jaipur from the central table-land is to the east and south-east, though a few streams follow the slope to the north-west. The soil in the immediate neighbourhood of the city, and to the west and north also, is generally sandy. In some places there are tracts of barren sand, frequently underlaid by clay and stiff soil mixed with *kankar*.

Indian corn, with cotton and *til* (sesamum), are grown in the rains; while in the cold season wheat, barley, gram, sugar-cane, opium, tobacco, *dāl*, and linseed are extensively raised. In the eastern districts rice of a coarse quality is cultivated to a limited extent. The population is estimated at about 250,000.

The most noticeable feature in the commerce of the state is the large banking and exchange business carried on at the capital and in the large towns. The chief manufactures are—marble sculpture, enamel work on gold, for which the artisans are justly famous, woollen cloth, and other fabrics.

The climate is dry and healthy, and malarious fevers are of rare occurrence. In the cold season the temperature is very agreeable; but in Shaikhawati it is often unpleasantly cold, and hoar-frost frequently remains in the shade till long after sunrise. During the hot season the winds from the west blow with great force in Shaikhawati and the northern portions of Jaipur; but the sand soon parts with its heat, so that the nights are generally pleasant and the mornings cool. Towards the south and east, the hot winds are less strong; but owing to the soil not being sandy, the nights and mornings are not so cool. May and June are generally the hottest months; January and February the coldest. There is usually a fair rainfall throughout the state, except in Shaikhawati; and Jaipur proper is seldom afflicted with the periodical famines which visit the neighbouring territories, for, being on the verge of the south-east and south-west monsoons, it receives rain from both.

When the mutiny broke out in 1857, the Maharajah of Jaipur at once placed the whole of his available military power at the disposal of the political agent, and in every way that lay in his power assisted the British government. For his praiseworthy behaviour and liberality during the famine in Rajputana in 1868, and his general services and loyalty, he was created a knight grand commander of the Order of the Star of India.

JAIPUR (*Jeypore*), the capital of the above state, is situated on the Rajputana State Railway and the Agra and Ajmere trunk road, 119 miles north-east of Ajmere. It is the largest town and the chief commercial centre of Rajputana, and in many respects the finest of modern Hindu cities. From east to west it is a little over 2 miles in length, and in breadth about $1\frac{1}{2}$ mile. It is laid out in rectangular blocks, and is divided by cross streets into six equal portions. The main streets are paved, and the city is lighted by gas. The houses of the nobility and the citizens are in the suburbs, while the maharajah's palace with its pleasure-grounds occupies the centre of the town,

covering about one-seventh of the total area. There are several banking firms, which possess a total capital of upwards of £6,000,000 sterling. Exchange and banking constitute the greater portion of the trade of the place. The city is well provided with hospitals, dispensaries, almshouses, and schools. Good drinking water is brought into the city from the Aman-i-Shah River, about 4 miles distant. It is raised by steam pumps about 104 feet into service reservoirs, which command the city, and through which it is delivered in iron pipes under 50 feet pressure. The population is 140,000.

JAJPUR, a town in the Cuttack division, Bengal, British India. It was the chief town of the province under the Kesari dynasty until the eleventh century, when it was superseded by Cuttack. Jajpur is celebrated for its settlements of Brahman Sivaite priests, and as the headquarters of one of the four regions of pilgrimage into which Orissa is divided—viz., that sacred to Parvati, the wife of the All-destroyer. There are numerous ruins of Sivaite temples, sculptures, &c. In the sixteenth century this town was the scene of the struggle between Mussulman and Hindu power, from which it emerged in ruins. It, however, still ranks as the fourth town of Orissa, and derives much wealth from its yearly fair in honour of Baruni, queen of the waters, on which occasion crowds of pilgrims flock to bathe in the holy Baitarani, the Styx of Hindu mythology. The population is 10,000.

JALALABAD, a town of Afghanistan, situated in a fertile plain near the Cabul River. It is 100 miles from Cabul, and 91 from Peshawur. Between it and Peshawur intervene the Khyber and other adjoining passes; between it and Cabul the passes of Jagdalak, Khurd-Cabul, &c. The most notable fact in the history of Jalalabad is the stout and famous defence made from November, 1841, till April, 1842, by Sir Robert Sale with his illustrious garrison. [See AFGHANISTAN.] Jalalabad was occupied by British troops during the Afghan campaign of 1878-79.

JALAP is a drug consisting of the dried tubers of a plant called *Ipomœa Purga*, a native of the Mexican Andes. The jalap plant grows well in the south of England, but the tubers are apt to be killed by the frost. It succeeds admirably in the Neigherri Hills in India, but it is not cultivated there yet to any extent. The drug was first introduced into Europe in the sixteenth century by the Spaniards. Jalap is chiefly shipped from Vera Cruz, and takes its name from the town of Xalapa, or Jalapa, in the interior. The large root, which often weighs 50 lbs., is divided into portions, which are hung in nets over a fire, and dried in ten or twelve days. It occurs in commerce in irregular round or pear-shaped masses, which, when good, are dry, hard, with a brown shining fracture, resinous, not light, somewhat tough. It is often adulterated with portions of the root of white bryony, which, however, are white, or when old gray, not heavy, very brittle, fracture not resinous, spongy, without smell, but with a very bitter taste. Dried pears are also often substituted for it; but they may be detected by being laid open, when the core will be seen containing the seeds. Jalap is ranged with the drastic purgatives, and where one of a resinous kind is desired, is that usually selected. Its action is generally certain, and in combination with other substances mild and speedy. It does not seem greatly to influence the nerves of the abdomen, but rather the vascular system of the pelvis and lymphatic system of the intestines.

Another kind of jalap is that known as Mechoacan root, the tubers of *Ipomœa Jalapa*, a native of Mexico and the southern United States; it is no longer imported, as it is not so active as the common jalap. Light jalap, or Orizaba root, is the product of *Ipomœa orizabensis*, and Taupico jalap of *Ipomœa simulans*. The "Marvel of Peru" was at one time supposed to yield jalap, and was on that account named *Mirabilis Jalapa*. See IPOMŒA.

JALAPA or **XALAPA** is a city in Mexico, 70 miles W.N.W. of Vera Cruz. There are 12,000 inhabitants, who trade in maize, fruit, sugar, and honey, and manufacture some pottery. This city is built at an altitude of 4350 feet, and the medicinal weed *jalap* grows here wild, whence its name.

JALAPIN, a resinous substance forming the active purgative principle of *jalap* (*Ipomœa Purga*) and of scammony (*Convolvulus scammonia*), both plants of the natural order Convolvulacea. It is a colourless amorphous powder, which melts at 150° C. (302° Fahr.) to a clear resin. It is tasteless and inodorous. It is insoluble in water, but very soluble in alcohol, ether, chloroform, and benzene. The formula is $C_{34}H_{50}O_{16}$. It is an active aperient in doses of from 2 to 5 grains. When dissolved in alkalies, it forms jalapic or scammonic acid ($C_{34}H_{60}O_{18}$), an amorphous yellow sweetish substance with strongly acid properties, soluble in water and in alcohol. It forms a number of salts, known as jalapates. Jalapin and jalapic acid are both decomposed by mineral acids, forming jalapinol ($C_{32}H_{62}O_7$), jalapinolic acid ($C_{16}H_{30}O_3$), and glucose. Both are white crystalline bodies, soluble in alcohol and ether; the latter is a strong acid, and forms a series of crystalline salts known as jalapinolates.

JAMAICA, one of the Greater Antilles, and the most important possession of the British in the West Indies, extends from 76° 11' to 78° 19' W. lon., and from 17° 45' to 18° 30' N. lat. Its length from east to west is about 140 miles, and its width may on an average be 40 miles. The entire area is about 6000 square miles. Its aboriginal name was *Xaymaca*, the land of wood and water, which very fairly describes its general aspect.

The surface of the island is very uneven. The eastern part is almost entirely filled up by the Blue Mountains, whose principal ridge occupies the middle of it, and runs nearly east and west. This range varies from 5000 to 6000 feet in elevation, and it has numerous offsets on each side. The western boundary of this mountain region is formed by a ridge which runs across the whole island from south-east to north-west, and rises in some places to a height of 4500 feet. The greatest plain in the island is that of Liguanea, which begins a few miles east of Kingston, and extends westward to a distance of about 30 miles; its average breadth is about 5 miles. Another level spot is the Plain of Vere, separated from the former by a low range of hills; and minor ranges exist in other parts of the island, which inclose numerous valleys.

The central heights are said to be remarkably favourable to longevity, and often attract invalids from the United States. The rainfall varies in different years from 60 to upwards of 120 inches.

Near the central line of the island, the hills present the characteristics of the limestone formation of which they consist. Caverns occur in several places, and some of them are very extensive. The water which runs down from the hills forms small rivers; these flow for a short distance and then disappear in holes, and sometimes come again to the surface and again sink. These districts are only provided with running water during the rains, and the inhabitants are obliged to have recourse to tanks or cisterns, in which they collect the rain-water for the dry seasons. In other districts, Jamaica has the advantage of being well watered by numerous rivers, rivulets, and springs. None of the rivers are navigable except the Black River; but as Jamaica contains 500 miles of sea-coast and nearly 100 harbours, bays, creeks, and coves, the want of river navigation is not much felt.

The climate of Jamaica is hot in the lower plains along the southern coast, but in other parts is much milder and very healthy. Snow has never been observed, even on the most elevated peaks; hail is not a rare occurrence on them, but it melts as soon as it reaches the ground. There are

two rainy and two dry seasons. The rains last from about May to July or August, and during October and November. The dry seasons occur between these periods. The July rains are most copious and long-continued, and are accompanied by excessive heat. Earthquakes are frequent; hurricanes less so than in the other West India islands. The minerals of Jamaica are very numerous, consisting of the ores of iron, copper, lead, zinc, cobalt, and manganese, together with limestone, sulphate of barytes, iron pyrites, marble, gypsum, and lignite. Valuable quarries of lithographic stone have been discovered, and traces of coal found.

The sugar plantations still supply the staple article of export. On the hills and their declivities coffee is cultivated to a great extent. Next to these come the pimento plantations. Arrow-root, indigo, cotton, and cacao are much cultivated; ginger and turmeric are also produced. Among plants which the government has endeavoured, with considerable success, to acclimatize, are the *ipeacacuanha*, the mangosteen (from Penang), the mango (from Bombay), the *Lisal* hemp aloe, nutmeg, clove, cinnamon, black pepper, *Latakia* tobacco, China grass, the Assam tea plant, and new varieties of the orange and pine apple. The cinchona plant was introduced into the island in 1806, the trees being grown in the Blue Mountains at a height of from 4000 to 6000 feet above the sea. Much land is also devoted to the cocoa-nut trees, for which both the soil and climate are admirably adapted. Indian corn is universally grown. Guinea-corn and rice are cultivated, as are also yams, cassava, sweet potatoes, artificial grasses, and a great variety of delicious fruits. The forests contain mahogany, satin-wood, cedar, fustic, logwood, bamboo, and various other trees. Fruits of various kinds are largely exported. Oranges especially, now that there is direct steam communication with the United States, have become a lucrative investment. The horned cattle are numerous, and cattle farming is becoming quite a feature in the island. The horses are hardy and active, but only fitted for the saddle and harness. Mules are employed on the sugar estates. Sheep, goats, and hogs abound, and all kinds of poultry, excepting geese and ducks. The manufacture of tobacco, rum, and of late years soap, forms almost the only manufacturing industries of the island.

Jamaica was possessed by the Spaniards from 1510 to 1655, and during the 150 years of their occupation the inhabitants, including Africans and Europeans, had not attained the number of 3000. Within about the same period of English rule (from 1655 to 1806) the number was 340,000—30,000 whites, 10,000 free people of colour, and 300,000 slaves. The population in 1881 was 580,801—of whom only 14,433 were whites. After the passing of the Slave Emancipation Act the trade and productiveness of the island very much declined, although it is only fair to add that even before the new order of things the commercial crops had been steadily decreasing. Sugar plantations are now few in number as compared with former times; for as the negro obtained with little exertion the means of subsistence, he was unwilling to devote himself to onerous agricultural toil. By the roadsides, on the edge of the wood and jungle, the pleasant garden and provision grounds of the African may be seen, where cocoa and bread-fruit trees are cultivated, with oranges, mangoes, plantains, and yams. In most instances the occupier had simply squatted upon large tracts of land, with no right but possession. By the District Lands Law of 1871, however, all land not held with a legal title was appropriated by the crown, and a fair rent must be paid and leases obtained.

The disinclination to labour on the part of the freed negro gave rise to a large importation of coolies, but with enlarged facilities for obtaining land virtually their own, the negroes appeared to rise in the scale of civilization

and as their wants increased their inducements to labour also increased, and the result is a large addition to the exportable produce of the island and a consequent accession of wealth. The troubles of Cuba in 1873-76, and the anticipated extinction of slavery there, caused an exodus from that island to Jamaica of just the description of people best calculated to assist in the productiveness of the latter island—men with capital and a large experience in developing the resources of West Indian land. In fact in every respect the island seems to be in a really prosperous condition, and a turn in the tide seems to have been taken which bids fair to run permanently in the direction of quiet and material progress. The soundness of its commercial position is well shown by the rapidity with which trade recovered from the effects of the terrible hurricane of the autumn of 1880, followed by the drought of 1881. Even the sugar cultivation, about which there have been so many complaints, cannot be considered as in such a very bad condition, for though barely holding its ground in proportion to the remaining items of export, its individual output steadily increases year by year. In obtaining this result, steam and the introduction of new varieties of cane, by means of the admirable system of public gardens and plantations, where experiments are made in the naturalization of all kinds of seeds and roots, have greatly assisted. The material prosperity of the great body of the people is most marked. Man, woman, and child, all are well dressed; rags are a phenomenon, and even patches a remarkable rarity. On the weekly market days and on Sundays anywhere over the island will be found met together a body of peasantry certainly and absolutely better clothed than similar groups in almost any other country.

Jamaica is politically divided into three counties: Surrey, in the east; Middlesex, in the centre, and Cornwall, in the west. These are subdivided into fourteen parishes. Spanish Town is the capital, Kingston the largest place, and there are thirty-two other towns and villages. Of the inhabitants of Jamaica, the Maroons were originally runaway slaves, partly from Jamaica itself, partly from Cuba, who lived in the forests on the northern side of the island. In 1738 a tract of land was granted to them in those parts, which they cultivated, and on which they built two small towns; and though a portion of them forfeited their privileges by a rebellion, others have preserved them to this day. They are loyal to the British government, but exhibit on all occasions a bitter hostility to the negro. No traces of the native population of the island existed when it was taken by the English from the Spaniards.

Jamaica was discovered by Christopher Columbus on his second voyage, the 3rd of May, 1494, but was not settled by the Spaniards before 1510. In 1655 it was taken from the Spaniards by the English, who for some time did not appreciate its value. Since 1655 it has remained in the undisputed possession of the British, but its internal peace has been seriously disturbed on several occasions. On 22nd February, 1745, about 900 negro slaves were detected in a conspiracy to destroy all the white inhabitants of the island. In 1795 the Maroons revolted, and were not reduced to subjection till 11th March, 1796. But the most alarming outbreak took place on 22nd December, 1831, when the island was placed under martial law, and most stringent measures and numerous executions followed. In 1865 another negro insurrection took place in Morant Bay, in which many whites were most barbarously murdered; but owing to the prompt measures adopted the rising was speedily quelled. The severity used in its suppression, however, gave rise to considerable discussion.

The executive was formerly in the hands of the governor, who, as well as the council, consisting of fifteen persons,

was appointed by the crown. The governor held the chief civil and military authority, his council constituted the Upper House. The Lower House, or the Assembly, was composed of forty-seven members, two from each of the parishes. But this organization was put aside in 1866 by an Act of Parliament, which vested the supreme authority in the hands of the crown, and abolished the houses of legislature. In 1884 the constitution and the legislative council was remodelled, and there are now six nominated official members, whose number can be increased to nine, and nine elected non-official members. The supreme court of Spanish Town, and courts of assize in each county, sit three times yearly. Before 1870 there was an established Episcopal church in Jamaica, but the Clergy Act, under which it possessed its special distinctions and privileges, expired with 1869, and has not since been renewed. Besides the Episcopal clergy, there are Scotch Presbyterian, Wesleyan, Baptist, and Moravian ministers in nearly all parts of the island.

Education has made surprising progress considering the difficulties to be encountered among a negro population, and the circumstance that the so-called English language spoken by the negroes of perhaps less than fifty years ago was a barbarous jargon of English words intermixed with others of Spanish and French origin, grafted on an African stem, forming, in fact, a "patois," and that the children of such parents have not yet learnt to use a much purer form of speech. The number of pupils is now more than 40,000. The income and expenditure of the colony are each about £500,000 per annum, and in 1885 there was a public debt of £1,250,000. The guaranteed debt amounts to about £300,000. The imports are valued at from £1,500,000 to £1,700,000 per annum, and the exports at about £1,100,000. The largest items in the former are cotton manufactures, fish, flour, haberdashery, and hardware, and of the latter sugar, rum, logwood, coffee, and pimento.

JAMES I. King of Scotland, was a younger son of King Robert III. His elder brother David having been made away with, it is said, by the Duke of Albany, the king caused James to be sent secretly to France, to preserve him from a similar fate. The vessel was taken by an English ship of war, and the prince carried prisoner to London. His father was so affected by the news that he died of a broken heart. The Duke of Albany was thereupon made regent of the kingdom. James, now in the thirteenth year of his age, was on 11th April, 1405, conducted to the Tower, and he afterwards resided in Nottingham Castle and in Windsor Castle, where he first saw and loved Lady Jane Beaufort, whom he afterwards married, and whose charms he has celebrated in his "King's Quhair." Henry IV. caused him to be well educated, and in 1417 Henry V. took him with him on his second expedition to France. The Duke of Albany died in 1419, and from that time measures began to be taken seriously for his release. He ascended the throne in 1424, and immediately took active measures to restore the kingdom to order by putting a check to the ambition of the Albany family and its adherents. He also adopted wise provisions for the government of the country, and ordered the statutes of Parliament, for the first time, to be regularly enrolled. At a later period of his reign James evinced great energy and promptitude in suppressing the disturbances in the Highlands and Isles. The rebels made an unconditional surrender, and the Lord of the Isles was obliged to make his submission on his bended knees at Holyrood House. The king's vigour and determination proved so obnoxious to the nobles that they formed a conspiracy against him, under the Duke of Athol, the king's uncle, and on 21st February, 1437, he was murdered, in the forty-fourth year of his age. James was distinguished for his literary and poetic talents: three pieces of his have come down to us, "Christ's Kirk on the

Green." "The King's Quhair" (or book), and "Peebles at the Play," all displaying considerable intellectual power and much humour.

JAMES II., King of Scotland, only son of James I., succeeded to the crown when about seven years old. The turbulence of the nobles, to which his father fell a sacrifice, continued undiminished throughout his reign, and he was little more than a tool in the hands of a faction. To add to the calamities which the country suffered it was visited by plague and famine. The king was also attacked from England, and at the siege of Roxburgh, which was occupied by the English, he was killed by the bursting of a cannon. This was in the year 1460, and in the twenty-ninth year of his age.

JAMES III., King of Scotland, was, like his father James II., about seven years old at his accession to the throne, 3rd August, 1460. He had to contend at the beginning of his reign with the Lord of the Isles, who allied himself with Edward IV. of England for the conquest of the kingdom. While this rebellion convulsed the north the minor officers of magistrates and common-councilmen in the several burghs were objects of tumultuous contest; and the Act 1469, c. 29, was passed, the foundation of the *close system* that existed till the Burgh Reform Act for Scotland. The king appears to have been the slave of his ecclesiastics and attached to low favourites, who involved him in a quarrel with his son and his nobles, terminating in the encounter at Sanchieburn. The king fled from the field, and falling from his horse was, it is stated, killed, and his body carried off, nobody knew where. This happened in June, 1488, in the thirty-fifth year of his age.

JAMES IV., King of Scotland, son of James III., was about fifteen years old at his accession to the throne, 11th June, 1488. He was of an active disposition, and the commerce and literature of the country flourished under his encouragement. But he became melancholy and superstitious, and in 1494, by the direction of the Pope's legate, bound about his waist an iron belt, to be worn day and night for the remainder of his life, as a penance for his participation in the rebellion against his father. In 1512 a great council of the clergy was held at Edinburgh, where the famous *Valor Beneficiorum*, called "Baginont's Roll," was made up. The following year the king, taking up the French cause against the English, entered with the flower of the kingdom on the fatal field of Flodden, where he was slain.

JAMES V., King of Scotland, son of James IV., was little more than a year old when the crown devolved upon him in 1513. The regency of the young king was long an object of ambition. The slaughter of so many noblemen at Flodden had, however, given a decided advantage to the clergy. Gavin Dunbar, who had been the king's preceptor, was made Archbishop of Glasgow in 1524; in 1528 he was appointed lord chancellor; and in four years afterwards the Court of Session was erected—a court of general and supreme jurisdiction under the chancellor. When Cardinal Beaton succeeded to that office its vast powers were exercised with such force as to threaten the extermination of every authority in the kingdom but its own and the papal. Much discontent was hence created, and in the course of a war which ensued with the English, the Scottish barons and their troops refused to obey the orders of the king and attack the enemy. They were disbanded, but another army which was collected soon after mutinied at Solway Moss, and surrendered to the English almost without striking a blow. These vexations had such an effect on James that he died in the thirty-first year of his age, in December, 1542, leaving a daughter, the unfortunate Mary Stuart, only a few days old. James patronized literature and architecture, and is said to be the author of one or two songs yet popular in Scotland.

JAMES I. of England and VI. of Scotland, the only offspring of Mary, queen of Scots, by her second husband Henry Stuart, Lord Darnley, was born in the Castle of Edinburgh, 19th June, 1566. The murder of Darnley took place on 18th February, 1567, and was followed by Mary's marriage with Bothwell, and her forced resignation of the crown in favour of her son, who was crowned at Stirling on the 29th of June, 1567, as James VI., being then little more than a year old. Before his mother's marriage with Bothwell he had been committed by her to the care of the Earl of Mar, who had retired with his charge to Stirling Castle. Here he continued to reside during the regencies of the Earl of Murray, of the Earl of Lennox, of the Earl of Mar, and of the Earl of Morton. Morton was compelled to resign the regency at Edinburgh, 10th March, 1578. Affairs were now nominally administered by the king, assisted by a council composed of twelve of the nobility. The new government, however, soon became unpopular, and Morton contrived to regain his former power. But in the midst of his success the regent was accused by the king's favourite, Esmé Stuart, brother of the Earl of Lennox, and Captain James Stuart, afterwards created Earl of Arran, of having been accessory to the murder of Darnley. He was immediately committed to prison, and after trial executed at Edinburgh, 2nd June, 1581. The two favourites then became the rulers of the kingdom. In August, 1582, occurred the Raid of Ruthven, the immediate consequences of which were the expulsion of the favourites, and the restraint, amounting to imprisonment, of the king, by the faction headed by the Earls of Mar, Gowrie, and Glencairn, Lord Lindsay, and others, for about ten months. At last, having been permitted to go from Falkland to St. Andrews, 27th June, 1583, he contrived, with the assistance of some friends, to throw himself into the castle there, and to maintain his position till his enemies gave up the contest. One of the king's first acts after he recovered his liberty was to release Arran, and again to commit to him the management of affairs. Though James had visited Gowrie and granted him a pardon, yet he now caused him to be executed. On the 29th July, 1585, a treaty of intimate alliance was concluded between Queen Elizabeth and the Scottish king, and an annual pension of £5000 was settled by the queen on James. Through the instrumentality of a new court favourite, the eldest son of Lord Gray, Elizabeth now sought to overthrow Arran. With her connivance the Eads who had been banished on account of the Raid of Ruthven entered Scotland at the head of a force of 10,000 men in the end of October, 1585. Arran and his late associates were all dismissed from power, he himself being besides stripped of his titles and estates. The new settlement of the government was followed by the conclusion, 8th July, 1586, of another treaty offensive and defensive with England. In October of the same year the unfortunate Mary, after an imprisonment of nearly twenty years, was at last brought to trial, and on the 8th of February following she was put to death. Between her condemnation and her execution James made considerable exertions to save her, but was very soon pacified, and continued on the same terms of friendship with Elizabeth as before. Gray, however, who had betrayed James' interest at the English court, where he had been sent to negotiate on behalf of Mary, was disgraced and dismissed.

In 1589 James was married to the Princess Anne, the second daughter of Frederick II., king of Denmark. He proceeded in person to Upsal in Norway, and did not return to Scotland till 20th May, 1590. The first memorable event that then occurred was a daring attempt by his relation, Francis Stuart, lately created Earl of Bothwell, a grandson of James V. by his son John, prior of Coldingham, who collected a force of his retainers, and on the night of 27th December, 1591, entered Holyrood House,

set fire to several of the apartments, and had nearly made his way to the king's chamber; he failed, but succeeded in making his escape and fled to the north. Bothwell and all his adherents were soon after attainted in Parliament. In the beginning of 1593 a new conspiracy of Huntly and the other heads of the Roman Catholic faction was detected; and a few months later Bothwell, having failed in another attempt to seize the royal person at Falkland, suddenly returned from England, where he had been protected by Elizabeth, and on 24th July, 1593, entered the palace with a band of armed followers and made the king his prisoner. James was obliged both to grant a full pardon to the traitor and to dismiss the Chancellor Maitland and his other chief ministers, and he remained in durance till the beginning of September. Disturbances, however, were again and again excited in the course of this and the two following years by the factions of Bothwell and the Roman Catholic lords, who, at length joining their forces under the conduct of the Earls of Huntly and Errol, encountered the royal army, commanded by the Earl of Argyle, at Glenlivet in Aberdeenshire, 3rd October, 1594, and put it completely to the rout. But in consequence of an expedition into the northern districts, conducted by James in person, the Roman Catholic lords were forced to make their submission and allowed to retire beyond seas. Bothwell fled to France, from whence he withdrew to Italy, where he professed himself a convert to Roman Catholicism, and spent the rest of his days in obscurity and indigence.

These commotions had scarcely been quieted when James became involved in new troubles in consequence of a contest with the clergy of the Presbyterian Church, which had been established as the national form of religion by an Act of the Scottish Parliament in 1592. By an unusual exertion of vigour and firmness James was enabled to crush the insurrection, and to turn the occasion to account in bringing the church into full subjection to the civil authority. In the course of the following year, 1598, the substance of Episcopacy, in a political sense, was restored by seats in Parliament being given to about fifty ecclesiastics on the royal nomination. Even the General Assembly was gained over to acquiesce in this great constitutional change.

The most memorable event in the remainder of James' Scottish reign was the very mysterious affair known in history by the name of the Gowrie Conspiracy—an attempt to seize the king by Alexander Ruthven, a younger son of that Earl of Gowrie who was executed in 1584.

James at length became King of England by the death of Elizabeth, 24th March, 1603. The conspiracy of Sir Walter Raleigh, Lord Cobham, and others, to place on the throne the Lady Arabella Stuart, James' cousin, was the first affair of interest. The next was the settlement of the disputes between the church and the Puritans. James' first Parliament met on 19th March, 1604. In his speech to the House he zealously urged the union of England and Scotland into one kingdom; but nothing came of this proposal at the time. James, however, of his own authority, now assumed the title of King of Great Britain.

Peace with Spain was concluded 18th August, 1601. The great event of the year 1605 was the Gunpowder Plot. [See GUNPOWDER PLOT.] In 1612 the death of James' eldest son, Henry, prince of Wales, in the nineteenth year of his age, spread a general grief through the nation. The death of Prince Henry was followed, 14th February, 1613, by the marriage of James' daughter, the Princess Elizabeth, with Frederick, the elector palatine. James caused great discontent in the country by the favourites whom he successively encouraged. Of these the chief were Carr or Ker, earl of Somerset, who married the Countess of Essex, and together with her was convicted of the murder of Sir T. Overbury; and George Villiers, who, after having been knighted, was created successively Earl of Buckingham, Marquis of Buckingham, and Duke of Buckingham, and

who continued to be the first favourite and ruling minister during the remainder of the reign. [See BUCKINGHAM.] In the summer of 1617 James paid a visit to Scotland, and having summoned a Parliament, succeeded in obtaining the assent of that body, and also of the General Assembly, to such regulations as brought the Scottish Church very nearly to the model of the English.

The year 1618 was disgraced by the execution of Sir Walter Raleigh. The public indignation at the king's subserviency to the court of Spain was roused to a high pitch by the events of the two following years. Austria, assisted by Spain, attacked the Bohemians, who had chosen the Elector Palatine for their king, and James refused to take part with his son-in-law and the Protestant interest on the Continent, or even to acknowledge his new regal title. In the Parliament which was called in 1621, after an interval of six years, memorable among other things for the impeachment of Bacon [see BACON, FRANCIS], the first decided step was taken by the Commons in their contest with the crown by their famous protest, passed 18th December, 1621, in reply to the king's assertion that their privileges were derived from the grace and concession of his ancestors and himself—"That the liberties, franchises, and jurisdiction of Parliament are the ancient and undoubted birthright and inheritance of the subjects of England." This resolution, which the king tore from the *Journals* with his own hand, was followed by the immediate prorogation and soon after by the dissolution of the Parliament, several of the leading members of the House of Commons being at the same time sent to the Tower or to other prisons. As the public clamour for the recovery of the palatinate still continued, another Parliament was assembled in February, 1624, which eagerly granted supplies for the attainment of that object by force of arms; war was in consequence declared against Spain, and an army under Count Mansfeld was sent into Germany in the latter part of the year. But this expedition turned out an utter failure.

James' reign of nearly fifty-eight years in Scotland and rather more than twenty-two in England was terminated by his death on 27th March, 1625. His children by his queen, Anne of Denmark, born 12th December, 1574, married 24th November, 1589, died 2nd March, 1619, were:—(1) Henry Frederick, born at Stirling Castle, 19th February, 1594, died 6th November, 1612; (2) Robert, died in infancy in Scotland; (3) Charles, who succeeded his father as king; (4) Elizabeth, born 19th August, 1596, married to Frederick V., elector palatine, 11th February, 1613, died 8th February, 1662; and three daughters, who died in infancy.

James I. was a voluminous author. His works have been partially enumerated by Harris in his "Historical and Critical Life" and by Horace Walpole in his "Royal and Noble Authors," but the fullest account is that given by Dr. David Irving in his "Lives of the Scottish Poets." A collected edition of his works was published in folio in 1616 by James Montague, bishop of Winchester. The best known are his "Counterblast against Tobacco" and "Treatise on Witches." It ought not to be forgotten that the authorized translation of the Bible was commenced and completed under his auspices. The character of this monarch has been the subject of much critical discussion, the general result of which is decidedly unfavourable. The reader may compare the elder D'Israeli's vindication with the works of Lingard, Froude, Hallam, Mignet, and Agnes Strickland.

JAMES II. of England and VII. of Scotland was the second surviving son of Charles I. by his queen, Henrietta Maria of France, and was born 15th October, 1633. He was immediately declared Duke of York. After the surrender of Oxford to Fairfax in June, 1646, the duke, his younger brother Henry, and his sister Elizabeth were committed by Parliament to the care of the Earl of Northum-

berland. They continued under his care till 21st April, when the duke made his escape from St. James's Palace, and took refuge in Holland with his sister Mary, princess of Orange. After various adventures and changes of locality he settled at Paris; and here he chiefly resided till he attained his twentieth year, when he received a command in the French army, and served under Marshal Turenne. The peace concluded with Cromwell, however, in October, 1655, compelled him, with his elder brother, to quit France, upon which he retired to the Low Countries, and entered the Spanish service under Don John of Austria.

At the Restoration (May, 1660) the Duke of York returned to England with the king, and was made lord high admiral and lord warden of the Cinque Ports. In September, 1660, he secretly married Anne, the eldest daughter of the chancellor Hyde. In promoting the war with Holland he was very active, and assumed the command of the fleet, which he eventually resigned, as well as his office of high admiral, on the passing of the Test Act, which required all officers, civil and military, to receive the sacrament according to the usage of the Established Church. On 21st November, 1673, the Duchess of York having died two years previously, he married Mary Beatrice Eleanor, daughter of Alfonso IV., duke of Modena, then only in her fifteenth year. On 4th November, 1677, the duke's daughter Mary, then in her sixteenth year, was, greatly to the public satisfaction, married to her cousin William, prince of Orange.

During the excitement produced by Titus Oates' Popish Plot in 1678-79 the Duke of York, by the advice of his brother, retired to the Continent. While he was absent the famous bill for his exclusion from the throne was twice read in the Commons, and ordered to be committed by large majorities, and was only prevented from being passed in that House by the prorogation of Parliament, 27th May, 1679. On his return he became involved in the discreditable affair of the Meal-Tub Plot. The share which he had in this business only added to the dislike in which he was held by the great body of the nation, and which was still further increased by the severity of his administration of affairs in Scotland. On again taking up his residence at the English court he became his brother's chief counsellor, and much more than Charles himself the mainspring and director of the conduct of public affairs. To his instigation are chiefly attributed the general attack upon corporations, the executions of Russell and Sidney, and the other violent and despotic acts of the two closing years of Charles' reign. A new Exclusion Bill, which had been brought into the House, was twice defeated by the dissolution of Parliament.

On the death of his brother, 6th February, 1685, no opposition was made to the accession of James. His first act was to issue a proclamation ordering the customs and excise duties to be paid as usual; he went openly and in great state to the illegal celebration of the mass, and lost no time in sending an agent to Rome to make his submission to the Pope. He determined, however, to call a Parliament, as he said, simply to humour the English people, he himself being at the same time resolved to make himself independent of its authority, and to dissolve it when it opposed his wishes. In reply to an indirect appeal to the French king, that monarch transmitted to James 500,000 livres, and it was readily agreed, in requital, that the chief obstacle in the way of the seizure by the French king of the Spanish Netherlands should be removed by the existing treaty between Spain and England being held to have terminated with the death of Charles. These details of its commencement supply the keynote to the whole course of James' disgraceful reign. The Parliaments of England and Scotland met, and responded with the utmost submission to all the king's demands. While they were sitting both England and Scotland were invaded, the former by the Duke of Monmouth (the highly-popular illegitimate son of the late king), the latter by the Earl of Argyle, both of them having

been for some years exiles in Holland. Argyle, after the dispersion of his few followers, was apprehended and executed at Edinburgh, on 30th June, 1685. Monmouth was defeated 5th July in the decisive battle of Sedgemoor, and being two days after found concealed in a ditch was brought to London, and delivered to the executioner by his uncle on the 15th of the same month. The suppression of Monmouth's insurrection was followed by the savage military vengeance of Colonel Kirke, and the more revolting enormities of the "Bloody Assize," or "western campaign" of Chief-justice Jeffreys, as it was jocularly called by the king.

Among the arbitrary measures next taken by James, on his own individual authority, were—the abandonment of the legal test of conformity with the Established Church and of the penal laws against dissenters; the extinction of the liberty of the press; the bestowal of nearly all public employment upon Catholics; the sending of an ambassador, the Earl of Castlemaine, to Rome; and the reception of a nuncio from the Pope. To some of these measures Parliament offered a feeble resistance, while others were quietly submitted to; but on the publication of a second declaration of indulgence to dissenters, 27th April, 1688, which was commanded to be read by the clergy immediately after divine service in all the churches, Saneroff, archbishop of Canterbury, and six bishops—Lloyd of St. Asaph, Ken of Bath and Wells, Turner of Ely, Lake of Chichester, White of Peterborough, and Trelawny of Bristol—met in the archbishop's palace at Lambeth, 18th May, and drew up a petition to the king representing their aversion to obey the order. For this they were all, on 8th June, sent to the Tower, and afterwards, on the 29th, brought to trial before the Court of King's Bench, on the charge of publishing a false, fictitious, malicious, pernicious, and seditious libel, when a verdict of not guilty was pronounced by the jury, which was received with acclamations by the whole kingdom. This defeat, however, in no degree checked at the moment the infatuated king. He issued orders to prosecute all those clergymen who had not read his declaration, that is, the whole Church of England, two hundred excepted; he endeavoured to force a Roman Catholic president on Magdalen College, Oxford; and in the midst of this great contest with the church and the nation, on 10th June a son was announced to have been born to James.

James' son-in-law, the Prince of Orange, had not been an unobservant spectator of what was passing in England; and to him the hopes of the English people were now very generally turned. In compliance with the invitation of the heads of the parties in the state he landed, 5th November, 1688, with about 14,000 men, at Foxley in Devonshire. Before the end of that month James found himself nearly deserted by everybody. In the night of 12th December, having previously sent over the queen and the young prince to France, he embarked with a single attendant in a boat at Whitehall Stairs, from which he was forced the next day to land at Faversham, and thence returned on the 16th to Whitehall. On the 17th the Prince of Orange, having arrived in London, desired James to leave the palace. He proceeded to Rochester, and on the 23rd embarked on board a frigate and was conveyed to Ambletouse in Brittany. Thence he repaired to St. Germain, where Louis XIV. gave him the château of St. Germain for his residence, and bestowed on him a small revenue.

Meanwhile the English crown was settled upon the Prince and Princess of Orange as King William III. and Queen Mary. [See NASSAU, HOUSE OF.] In the beginning of March, 1689, James sailed from Brest, landed at Kinsale, and immediately marched to Dublin with a small force supplied by the French king. A few weeks after he laid siege to Londonderry, which, however, he was not able to reduce. After various military operations his cause was finally ruined by the defeat he received from King William in person at the battle of the Boyne, fought on 1st July,

1690. He soon afterwards returned to France, and resided at St. Germain till his death, 6th September, 1701.

By his first wife, Anne Hyde, James II. had eight children, all of whom died young except MARY and ANNE, afterwards queens of England. By his second wife, Mary of Modena, he had James Francis Edward, prince of Wales, styled the Elder Pretender, born 10th June, 1688, died at Rome, 30th December, 1765; one son, Charles, who died an infant; and four daughters. He also left several illegitimate children, the most distinguished of whom was Fitz-James, duke of Berwick.

The principal portion of the papers formerly belonging to the Stuart family, which were obtained by George IV. when regent, has been printed under the title of "The Life of James II., King of England, &c., collected out of Memoirs writ of his own hand; together with the King's Advice to his Son, and his Majesty's Will. Published from the Original Stuart Manuscripts in Carlton House, by the Rev. J. S. Clarke, LL.B., F.R.S., Historiographer to the King, Chaplain of the Household, and Librarian to the Prince Regent."

JAMES, THE GENERAL EPISTLE OF, one of the canonical books of the New Testament. In the early days of Christianity this epistle was placed among those writings which were regarded as of doubtful genuineness, and by some of the fathers it was rejected as a spurious production. On the other hand, many of them quote from it and accept it as authoritative, and at the Council of Carthage, 397 A.D., it was included in the list of canonical writings. The authorship of the epistle has given rise to considerable dispute, and it has been variously ascribed to James, the son of Zebedee, according to the Syriac version of the New Testament; to James, the "brother of the Lord," and to an unknown James. The opinion generally received among scholars is that it is the work of James brother of the Lord, also called James the Just, who was president over the church at Jerusalem, and who is several times referred to in the Acts of the Apostles and in the Epistles of St. Paul. The date has been variously estimated, some critics fixing it as early as 45, and others as late as 62 A.D. It is addressed to the Jews of the dispersion, to warn them against the sins to which they were most liable, and to comfort them in a time of trial and affliction. Chiefly moral in its tone, it lays stress upon the necessity for a pure and holy life, and points out that any belief that failed to produce this is valueless and dead. Many modern scholars have maintained the theory that it was designed to oppose the teaching of the apostle Paul on the subject of justification by faith, and Luther was so strongly of this opinion that he denied its canonicity, terming it "a veritable epistle of straw." On the other hand it has been pointed out that the two apostles deal with different sides of the same subject, St. Paul pointing out the way of salvation for sinners, and St. James showing the character of the faith that saves the soul. That there is no real difference is also manifest from the fact that St. Paul, no less than St. James, always enforces the necessity for holiness of life and diligence in good works.

JAMES, JOHN ANGELL, an eminent Independent minister, was born at Blandford, Dorset, in 1785. He studied for the ministry at Gosport Academy, and in 1805, at the early age of twenty, was ordained to the pastoral charge of Carr's Lane Chapel, Birmingham, where he remained till his death, 1st October, 1859. He was one of the most celebrated and influential of the nonconformist ministers of his day. He took a prominent part in all religious and benevolent enterprises, and was a most zealous and liberal supporter of educational and missionary schemes; but his most conspicuous service to the cause of religion was rendered by his numerous works, which have obtained a vast circulation.

JAMES' DAY, ST., the 25th of July, sacred in popular view to apples and oysters; for on this day the priests used to bless the apples in the old-world time before the Reformation, and in the Sarum church-books there is a special service for it. And as St. James' Day (old style) was for long the beginning of the oyster season, it was held that whoever ate oysters on that day would not want money for the rest of the year.

JAMES' POWDER, a patent medicine invented by a Dr. Robert James, who died 1776. It enjoyed at one time a very high reputation for the treatment of fevers and numerous other diseases, but it was admittedly a medicine of very uncertain action. Its preparation was kept a secret, the specification of Dr. James being deliberately falsified so as to protect the sale, but from analysis it is believed to consist of 50 per cent. of triphosphate of lime, 35 to 45 per cent. of antimonious acid, with a little antimonite of lime and tetroxide of antimony. It is still prepared and sold, but is very little used by modern practitioners, and its reputation has long since passed away.

JAMES TOWN, the capital town of St. Helena, situated on the north-west coast of the island. It lies in a narrow ravine and possesses a good harbour. The governor and principal inhabitants reside on the heights near the town.

JAMESON, ANNA, a well-known authoress, was born in Dublin, 1794. In 1825 she married Mr. Robert Jameson, a barrister, but soon separated from him. Her works are numerous, and those especially on subjects connected with art have had a very high reputation. Her "Characteristics of Shakspeare's Women" (1832), and her "Sacred and Legendary Art" (1848), are those by which probably she will be longest remembered. Mrs. Jameson died in 1860. Two interesting volumes of "Memoirs of Anna Jameson," by her niece, Geraldine Macpherson, were published in 1878.

JAMESONITE is an antimonial sulphide of lead. Although comparatively rare as a separate mineral, it often occurs intimately mixed with stibnite, which it affects most injuriously, rendering it almost useless as a source of antimony; it occurs thus in the Endellion and Tintagel districts in Cornwall.

JAN MAYEN, an island in the Arctic Polar Sea, lying between 70° 49' and 71° 9' N. lat., and between 7° 26' and 8° 41' W. lon. It extends from south-west to north-east about 30 miles, and is in no place above 9 miles in breadth. On the northern extremity, where the island is widest, stands the mountain called Beerenberg or Bear Mountain, a snow-capped peak rising to 6870 feet above the sea-level. Even in the beginning of August all the high lands are covered with snow and ice. The coast has several roadsteads with good anchorage in from 5 to 10 fathoms water, black sandy ground, but no harbour for a ship. There are foxes and white bears. Water-fowl are numerous. The vegetation is very scanty, and limited to a few plants scattered widely about among the volcanic minerals. The island was discovered in 1611 by a Dutch navigator called Jan Mayen, and was much visited up to about 1640 on account of the great number of whales, which, however, afterwards retreated to other parts of the Arctic Sea. A graphic account of it occurs in Lord Dufferin's "Letters from High Latitudes."

JANEIRO, RIO DE. See RIO DE JANEIRO.

JANICULAN HILL, a hill in Rome, but not one of the famous "seven hills." It is named after the ancient god of Rome, Janus. It lies across the Tiber, and is separated from the Vatican Hill by a little valley. Hero St. Peter is said to have been executed, whence the church of St. Pietro in Montorio on the Janiculan. The Janiculan and Vatican are both included in the seven hills of the earliest writers; the substitution of the gentle slopes of the Viminal and the Esquiline is of later imperial date. The Janiculan was fortified as part of Rome by Ancus

Martins, and certain sacrifices were always made upon it, the procession invariably crossing the Tiber by the Pons Sublicius, which was built of wooden beams (Lat. *sublicæ*) as Ancus had left it, and rebuilt as often as the river carried it away, which was not seldom.

JAN'INA, the capital of the Turkish province of Albania, is situated on the south-western shore of the Lake of Janina, and has about 25,000 inhabitants. It is supposed to stand on or near the site of the ancient *Dodona*. The city was taken in 1082 by the Normans, who under Bohemond, son of Robert Guiscard, defeated the Emperor Alexander Comnénos under its walls. In 1432 it fell into the hands of the Turks. An unsuccessful attempt made by the Albanian Greeks in 1611 to shake off the Turkish yoke led to their expulsion from the old or fortified part of the town, and to the extension of the city along the shores of the lake on each side of the fortress. Janina was the capital of the famous Ali Pasha, under whom it contained 40,000 inhabitants, including the garrison, sixteen mosques, eight Greek churches, the seraglio and palaces of the pasha, the fortress mentioned above, and two others named Coulia and Litharitz. When Ali found himself no longer able to defend his capital against the Turks, he ordered it to be set on fire, and it never recovered its previous importance. There are manufactures of gold brocade by Greek workmen, as well as gold lace for the East, and morocco leather, silk goods, and coloured linen. There are several mosques and Greek churches in the town. Janina stands in the midst of an extensive and fertile plain, which produces fruits and grain in abundance. In settling the new northern frontier of Greece in 1881 a strenuous effort was made by the Greeks to obtain the cession of Janina, as promised her by the Treaty of Berlin, but they were not successful.

JAN ISSARIES or **JANIZARIES**, the name of a Turkish militia, once formidable, but now extinct. The origin of this body dates from the reign of the Osmanli sultan Orthan, about 1330, and it was more completely organized by Amurath or Murad I. about 1362, who, after having overrun Albania, Bosnia, Servia, and Bulgaria, claimed the fifth part of the captives, from among whom he chose the young and able-bodied, and had them educated in the Mohannmedan religion and for the military profession. Until the death of Suleiman the Magnificent the Janissary body was recruited exclusively from captives, but after that time their numerous privileges led to the service being eagerly sought by young Turks. By the original laws of their body the Janissaries could not marry; but the prohibition was at first evaded, and at last totally disregarded. They were formidable to the government from their numbers and union, and they repeatedly mutinied against the sultans, and obliged them to change their ministers, or even deposed them. In more recent times they dethroned Selim, and in the beginning of the reign of the Sultan Mahmoud they broke out into a dreadful insurrection which lasted three days. At last Mahmoud II. resolved to abolish them, and issued secret orders, in accordance with which a general attack was made upon them in May, 1826, in which about 25,000 are said to have perished. MacFarlane in his "Constantinople in 1828" gives a vivid account of this catastrophe.

JAN'SENISM, a theological and literary movement within the Roman Catholic Church, so called from its being based on the theological system concerning grace and free will contained in the "Augustinus" of Cornelius Jansen, bishop of Ypres, who died in 1638. This movement, in the intention of its principal originators, Bishop Jansen and John du Verger de Haurnanne (better known as the Abbé de St. Cyran), aimed at bringing back ecclesiastical doctrine and discipline to the standards of teaching and practice of the early Christian ages. The originators and their followers purposed to reform the schools of theology

and the lives of men without breaking with the established order of things. From first to last the Jansenists called themselves Roman Catholics, accepting in theory the authority of Rome, while eluding or disregarding its doctrinal decisions. Jansen and Du Verger were both young men, nineteen and twenty-four respectively, when they formed a close friendship in the schools of Louvain. Both had imbibed the theological principles of Baius (Michael Bay) on grace and free will; and they formed the resolution of studying the works of St. Augustine, the great opponent of Pelagianism, and of making them the authoritative exposition of Christian dogma. They set themselves for task, Jansen in the Netherlands and Du Verger in France, to win over and use as instruments for their purpose the great theological schools of Louvain and the Sorbonne, while gathering around themselves, as Ignatius Loyola had done in the preceding century, men of genius and culture, who should aid them both in remodelling theological and classical education, and in influencing the leading classes in church and state. This programme was faithfully adhered to by both. Jansen was appointed in 1617 professor in the University of Louvain, devoting himself thenceforward till the end of his life to the study of St. Augustine. He became Bishop of Ypres in 1635, and died 6th May, 1638, leaving ready for the press his famous book "Augustinus," or "The Doctrine of St. Augustine on the Healthy Condition, the Diseased State, and the Medicinal Treatment of Human Nature, as against the Pelagians and Semi-Pelagians (Massilienses)." Jansen's twenty years' teaching at Louvain had prepared public opinion throughout the Netherlands for the appearance of this book. In Paris and the universities of France the successful labour of St. Cyran and his followers caused the publication to be hailed as an event in the religious world. Louvain was one of the great centres of missionary activity for the Jesuits, who had denounced the tenets of Baianism and watched the progress of Jansen and his disciples in both countries with a keen anxiety. The new reform began, like that of Luther, with a discussion on free will, grace, and the native capacity for moral good of mankind under the law of the gospel. The appearance of the "Augustinus" created a storm of excitement. The Abbé de St. Cyran had succeeded in France in forming what was already, in 1640, a formidable and influential party. Foremost among his followers was Antoine Arnauld, a doctor of the Sorbonne, a man of uncommon learning and ability, whose sister, Angélique Arnauld, was abbess of the Cistercian monastery of Port Royal des Champs, near Paris. She, too, was a woman of rare talents and accomplishments, and had under her care some of the daughters of the best French families. St. Cyran, by his austere exterior, eloquence, and his learning, had made an early and deep impression on these recluses. He continually held up to them the practice of the first Christian ages as the only ideal of spiritual perfection. They accepted his teaching with unquestioning and enthusiastic faith, and leavened with their own fervour their numerous relatives and friends. Near Port Royal monastery St. Cyran and Arnauld selected a site for a religious and literary retreat, which they called La Solitude, for their unmarried disciples of the other sex. From the beginning they discountenanced monastic vows, while encouraging community life and a certain rigorous asceticism. Into this Solitude flocked many of the most distinguished scholars of that or any other age, among whom shone Nicole and Pascal. This was the centre of the literary movement inaugurated in France by St. Cyran. These great scholars were known as the Solitaries of Port Royal. They aimed at remodelling the entire course of classical, philosophical, historical, and theological education. In this Solitude Arnauld and Nicole wrote the "Perpétuité de la Foi sur

la Présence Réelle," the great controversial masterpiece on the Eucharist; Pascal wrote his "Provincial Letters" and his "Pensées," and Tillemont the first volumes of his ecclesiastical history; here too were written the "Logique de Port Royal," and the exhaustive Greek and Latin Grammars, still retaining the name of the place and a fame for unquestioned excellence. While the Solitaries were thus educating the very élite of French intelligence, men of every profession in church and state, the nuns of Port Royal were educating the women of the capital with a zeal and energy that brooked no restraint. St. Cyran, who had taken on himself to hold up the constitution and discipline of the early church to the admiration and imitation of his followers, pushed his reform into all the details of Christian life—the celebration of the liturgy, the reception of the sacraments, and the practice of asceticism, as he conceived it. By voice and pen he sedulously inculcated the necessity of following the primitive rule. His "Lettres Chrésiennes et Spirituelles," which appeared in 1615, two years after his death, had great influence. He held it to be contrary to the primitive custom to confess any but mortal sins, and these without mentioning the number, or the circumstances altering the specific nature of the sin or notably aggravating its heinousness. While thus rendering confession apparently much easier, he made the reception of absolution and of communion incomparably more difficult. He required almost angelic purity of conscience, not only in those who received the Eucharist, but in those who would be present at Mass. His "Brief Explanation of the Mysteries of Faith" and "St. Augustine on Virginity" gave rise to a great outcry against him, especially as his annotations in the latter work were directly opposed to the definition of the Council of Trent on monastic vows and obligations. Antoine Arnauld, to whom he bequeathed his leadership, powerfully seconded this teaching in his work "On Frequent Communion," advocating the restoration of the public penances imposed on the early Christians, even for the most secret sins, and insisting on the necessity of a long and rigorous course of expiation for guilt before absolution and communion. This book wrought in many parts of France a change which is felt to the present day. In the diocese of Sens the bishop at once restored the practice of public penances; fifteen other bishops and twenty doctors of the Sorbonne gave their solemn sanction to this book. In the Netherlands, about 1643, the theories and practices of Jansenism were pushed forward with no less zeal and success. The "Augustinus" was first published in 1640. The theological basis of Jansenism, as taken from this book, rests principally upon the author's conception of free will. The will of man since the fall, according to Jansen, is impelled to good or evil by the force of heavenly attraction or by that of earthly pleasure. Whichever force preponderates at the time being determines the choice of the will. The only freedom which this faculty enjoys is the freedom from external compulsion. Divine grace acting interiorly on it is never resisted. Roman Catholic theologians, on the contrary, reject this mechanical conception of two forces acting in opposite directions, and affirm that it is essential to the freedom of the will that it should be able to resist either of these opposite impulses or attractions, and choose by virtue of its own native energy between the good and the evil soliciting it. Hence the alarm and excitement in all the great Catholic schools of the Continent at the appearance of this book of Jansen's, and especially at the formidable array of the upholders and advocates of this new doctrine, and of the radical reforms urged by them. In 1641 the "Augustinus" was condemned by the Roman Inquisition; in 1642 Urban VIII. issued a bull censuring Jansen's doctrine as a renewal of Baianism. The Archbishop of Mechlin, with several other Flemish prelates, and the University of Louvain refused to accept this

sentence; while in France the king and the Sorbonne promulgated it. The royal authority in the latter country was, from the beginning of this long controversy, exerted to sustain the papal decrees; whereas the authority of the French courts of parlement all over the kingdom was, from first to last, used against these decrees and in favour of the Jansenists, who assumed the name of "Disciples of St. Augustine." In 1649 a commission was appointed by the Sorbonne to examine five propositions, containing the quintessence of Jansen's doctrine. Thereupon Antoine Arnauld appealed to the parlement for a prohibition restraining the Sorbonne from proceeding in the matter. The prohibition was granted, and the parlement thenceforward was committed to the defence of Jansenism.

The further history of this movement may be divided into three phases or periods. 1. The first begins with the bull of Innocent X., 19th May, 1653, condemning the famous five propositions. This bull was promulgated by royal consent in France and the Netherlands, but while the Jansenists were compelled to admit that the propositions were heretical, they drew a distinction between "right" and "fact," and maintained that the Pope was misled in supposing these propositions were, in point of fact, to be found in the book. This led to a further enactment by Alexander VII. in 1654, by which the condemned propositions were identified with Jansenism, and this being accepted in France and enforced by the secular arm, all ecclesiastics were called upon to submit under pain of losing their benefices. In 1656 appeared Pascal's "Provincial Letters," assailing the teaching of the Jesuit moral theology with the most powerful invective and ridicule, while explaining away with surpassing eloquence and ability the objectionable features of the Jansenistic doctrines. Pascal, as well as the nuns of Port Royal, refused to accept any compromise, and both houses were partly broken up. After Pascal's death in 1662, Arnauld, Nicole, and their associates continued their literary and theological labours, even when banished to the Netherlands. Clement IX., in 1669, effected a temporary peace between the four Jansenistic French bishops and their brethren. This and the condemnation by Innocent XI., in 1679, of a number of propositions extracted from the works of casuist theologians, seemed to the Jansenists a victory for their cause. The contest in the Netherlands became fiercer by the presence and activity of Arnauld, the Flemish bishops being restrained from rigorous measures by the Holy See, while an unconditional condemnation of the five propositions was insisted on. In 1694 Arnauld died, leaving Pasquier Quesnel as his successor in the leadership. 2. Quesnel's "Moral Reflections on the Gospels," afterwards extended to the entire New Testament, afforded a fertile theme for passionate discussion from 1694 to 1719, the year of his death. The eloquence and influence of the Jansenist writers had not only won over several members of the French episcopate, but the majority of the Sorbonne, numbers of the aristocracy, and almost the entire French magistracy. The imprisonment and exile of Jansen's followers served only to make them more popular, and to spread their doctrines more effectually. In 1709 the Port Royal nuns, who had been forbidden to receive novices or pupils, were expelled and their house closed up. The conflict between the royal authority sustaining the papal decrees and the parlements of Paris and the provinces refusing to accept or register them, convulsed the whole kingdom, the bishops and the inferior clergy being also much divided on the vexed questions of doctrine and practice. Fénelon wrote to the Pope describing these deplorable discussions and the rapid spread of Jansenism throughout France and the neighbouring countries. In 1718 the bull Unigenitus appeared condemning Quesnel's teaching. Among other tenets therein stigmatized were such as these: that all love except the supernatural love of God is evil;

that without this love there can be no true hope, no possibility of keeping the divine commandments, no meritorious practice of religious duty; and that every prayer made by a sinner is only an additional sin. The bull dealt a great blow to Quesnel and his followers. Both the ecclesiastical and the royal authorities were exerted anew to obtain their acquiescence in the judgment of the Holy See. It was in vain. Quesnel died without submitting, and his followers, who affirmed that the Pope had been misinformed, appealed from his decision to the judgment of the church in council assembled. Then Jansenism entered on its third and last phase. 8. The movement, as we have said, was one strictly within the Roman Catholic Church. It became more and more evident that in the bull *Unigenitus* the supreme authority in that church had pronounced definitely against Jansenism. Those who resisted were thenceforward looked upon as a party. The party thus formed, which included four bishops and many inferior ecclesiastics, was known as the *appellants*, those of the other side being termed *acceptants*. The latter were victorious, and in 1730 the bull was registered as part of the national law of France. The appellants were now rigorously suppressed, and many of them fled to the Netherlands, making Utrecht their centre. Here they formed a separate community, and being deprived by the Pope of their bishop, they obtained in 1723 the consecration of another, Cornelius Steenhoven, from the French bishop Vorlet. Similar bishops were consecrated for Haarlem and Deventer, and a distinct organization has ever since been maintained. The Jansenists of Holland recognize the Pope as being the head of the church, and notify to the papal court every change in their bishops. They have protested, however, against certain ultramontane developments of doctrine, and they are treated as heretical by the papal authorities.

The Jansenists who remained in France at the time of the persecution in 1710-30 fell into some strange excesses of fanaticism. Miracle-working power was ascribed to the grave of one François de Paris, a young Jansenist deacon who died in 1727, and the wild extravagance of the Convulsionaries which followed brought the system into such disrepute that by the middle of the eighteenth century it ceased altogether to be a power in France.

JANSSENS, ABRAHAM VAN NUYSSEN, born at Antwerp in 1569, was a competitor with Rubens. In colouring he was far inferior to that painter, but his compositions are equally spirited and his drawing more correct. His pencil is decided, and his draperies natural. He is very fond of torchlight effects. He died in 1632. He stayed long in Italy, but he has hardly any of the Italian qualities.

JANSSENS, CORNELIS VAN KEULEN, was born at Amsterdam, came to England in 1618, and lived several years here. He was employed by King James I., and painted several fine portraits of that king and of his children, as well as of the principal nobility. His colouring is clear and natural; the carnations are soft, and except in freedom of hand and in grace, he was esteemed by his contemporaries equal to Vandyck. He died in 1665.

JANUARIUS, ST., a martyr of the Christian faith in the latter part of the third century. Tradition says that he was bishop of Beneventum, where he was seized during the persecution of Diocletian and carried to Nola. After being tortured he was taken to Puteoli and put into prison, whence he was forced into a den of lions, by whom being left unhurt his persecutors caused him to be beheaded. His body was carried to Beneventum, but removed to Naples by Alexander VI. in 1497. It is still preserved in the crypt of the cathedral in that city, and in a chapel of the same church are also kept the head of the martyr and two phials supposed to contain his blood. Many miracles have been ascribed to the relics; and the recurring miracle of the liquefaction of the blood contained

in the glass phials is still devoutly believed in by the Neapolitans. This usually takes place three times a year, viz., the first Sunday in May, the 19th September, which is the day assigned to this saint in the Roman Catholic calendar, and the 16th December. These days mark the greatest public festivals of Naples, and are sometimes attended by considerable excitement on the part of the population. The name *Januarius* seems at one time to have been somewhat common, and there are a number of minor saints and martyrs recognized under it by the Church of Rome.

JANUARY, the first month in our present calendar, was also the first month in the Roman calendar. It was not the first month in the year in this country till 1752, when the legislature, by an Act passed in the preceding year, altered the mode of reckoning time from the Julian to the Gregorian style. At that time it was directed that the legal year, which began in some parts of England on 1st March and in others on 1st January, should universally be deemed to begin on 1st January.

JANUS, in mythological history, is the earliest of the Italian kings, and reigned in Latium, being contemporary with Saturn. Janus, by some accounts, was the son of the Sun, and his attributes appear to connect him with sun-worship. Janus, equal to Dianus, is the masculine of Diana; these two being the ancient Latin sun and moon divinities, *Dia* corresponding to *Dyau* in Sanskrit, and all coming from the Aryan root *√dit*, to shine. He is the porter of heaven; he opens the year, the first month being named after him; he presides over the seasons, whence he is sometimes represented with four heads (Janus Quadrifrons), and his temples in that capacity were built with four equal sides, but only one entrance. He is the keeper of earth, sea, and sky; the guardian deity of gates, on which account he is commonly represented with two heads, because every door looks two ways; and thus he, the heavenly porter, can watch the east and west at once without turning. He usually carries a key in his left hand and a staff in the other. In war times the gates of the principal temple at Rome, that of Janus Quirinus, were always open; in peace they were closed to retain the war within; but they were shut once only between the reign of Numa and that of Augustus. Diana was also originally called in some dialects *Jana*. Diana became identified with the Greek Artemis. Dianus or Janus retained, however, his Latin characteristics very pronouncedly.

JAPAN, EMPIRE OF, a collective name given to an archipelago of islands in the North Pacific Ocean, off the coast of China, consisting of three large mountainous and volcanic islands, Nippon—the main island, often improperly called Nippon, a name which has been corrupted into Japan, meaning “sunborn” or “land of the rising sun,” and which really belongs to the whole empire—Kiu-shiu, and Shikoku, and an immense number of smaller ones, among which may be enumerated Yesso, Sado, Tsushima, Hirado, Awaji, Oshima, Kii, and the Oki, Gotô, Bonin, Loockoo, and Kurile groups. These extend from about 21° to 50° 40' N. lat., and from 124° to 156° 38' E. lon. The total area is 148,456 square miles, and the population in 1883 was 36,700,118, the number of heads of families being 7,681,986. The total foreign residents in the same year was 6187. Very exaggerated statements continue to be given as to the population of Japanese cities, arising from the inclusion of the population of the district around the city, including many square miles. The population of the capital, Tokio, in 1883 was 823,557, the next largest being Osaka with 233,681 inhabitants. For administrative purposes the empire is divided into forty-seven districts, or into three Fus and forty-four Kens. North spreads the Sea of Okhotsk, east and south the vast expanse of the Pacific Ocean, west and north-west the Strait of Corea, the Japanese Sea, and the Gulf of Tartary.

Physical Aspect, &c.—The largest island has a crescent shape, with the concavity turned towards the Asiatic continent. It measures 800 miles from north-east to south-west, while its breadth varies from 50 miles to 100. Kuishiu, divided from the main island by a narrow channel, is about 200 miles long from north to south, and 120 miles broad. Shikoku, which lies to the east of Kuishiu, is 140 miles long and 60 miles broad. The straits to the north and east, which divide Shikoku from the main island, are about 12 miles broad, but so beset with isles and islets that the navigable channel is frequently not more than one mile wide. Yesso is of a triangular form, and its three sides are respectively 300 miles, 260 miles, and 220 miles in length. The Strait of Sangar, about 8 miles wide, separates it from the main island on the south-east. To the west lies Sado, between Cape Noto and Russian's Cape: it is supposed to be about 45 miles long and 21 miles to 24 miles broad. The narrowest part of the channel which divides it from the main island does not exceed 20 miles across.

The coasts are generally rocky and extremely irregular, being broken up with numerous romantic inlets. They are deficient in good harbours, and from their exposure to frequent typhoons are the scene of numerous shipwrecks. A mountainous chain of considerable elevation traverses the whole insular series in the line of its greatest extent, many of its higher summits remaining clothed in snow for several months, and some throughout the year. In the chief island the highest peak is Fusi, a dormant volcano, 12,000 feet high.

The Japanese islands form a link in that great chain of volcanic action which is carried on from Kamtchatka through the Philippines, Sumbawa, and Java, to Sumatra, and thence in a north-westerly direction to the Bay of Bengal. The igneous agency is especially conspicuous in Yesso, the main island, and Kuishiu, and earthquakes are of common occurrence in all the islands. In Yesso occurs the great volcanic mountain of Fusi-yama, dormant since the year 1797, and rising to the elevation of 14,177 feet above the sea, so as to form the culminating point of the whole empire. It is the *mons excelsus et singularis* (the lofty and singular mountain) of the old traveller Kämpfer, who visited the island in the seventeenth century as physician to a Dutch embassy. "Poets cannot find words," he says, "nor painters skill and colours sufficient to represent the mountain as they think it deserves." It forms a magnificent cone, with an extensive truncated pinnacle; and shooting heavenward above all the encircling hills its snowy crest is visible from Tokio, a distance of 80 miles. Fusi-yama, the "rich scholar's peak," is regarded by the common people as a "holy place." They make pilgrimages to it, as the Moslems to Mecca, to ward off the anger of the gods, dressing for the occasion in white vestments, which the priests inhabiting the summit (during the summer months) stamp with various mystic seals and devices. A tradition runs that the volcano rose in a single night from the bowels of the earth, and that a spacious lake was simultaneously formed at Miaw, evidently referring to some great volcanic convulsion.

Several terrible eruptions have occurred in Yesso; one, in 1783, destroyed twenty-three populous villages; while the volcano of Wauzendake, in Kuishiu, broke forth in 1792, and overwhelmed with floods of lava and torrents of ashes and scorize no less than 53,000 people.

The Japanese mountains as a rule, however, present no bare and rugged outlines, being cultivated to their summits, or mantled with shaggy woods. The soil in volcanic districts is a rich, black, stoneless mould, several feet in depth, and composed of the detritus of igneous rocks; it has been enriched for several centuries by a constant application of the sewage from the great towns. The principal formations of the island are trachyte and basalt; hills of sandstone are numerous; and plastic clay, marl,

and felspar abound in various localities. The metallic treasures of the empire are considerable, comprising gold, silver, tin, copper, lead, and iron, both the tin and copper being of superior quality. Coal-measures are found in various districts; sulphur occurs in great abundance; and large quantities of ambergris are found floating on the shores. This is a product of the sperm whale, and is converted into a highly aromatic substance with stimulating qualities. The sulphur is admirably pure, and inexhaustible supplies are procurable at Sulphur Island, an active volcano off the south coast of Kuishiu. Hot mineral springs, saline and sulphurous, are largely patronized by the Japanese. The small village of Atami, sequestered in a seaward valley on the south-east coast of the main island, possesses so many boiling fountains that the entire locality may well be compared to a gigantic witches' cauldron. From numerous apertures is ejected a vast column of steam and slightly sulphurous water at a temperature of from 100° to 120° Fahr.

Climate.—In the northern islands the winters are long and severe; the summers short, but intensely hot. Snow lies even in the plains and valleys from November to May. In the southern regions of the empire the climate is not unlike that of France, the extreme heat of the summer months being tempered by the influence of the ocean breezes. The weather is more boisterous, and the general climate colder, on the western than on the eastern coast, for the same reason. In Kuishiu and the south of the main island the range of the thermometer extends from 29° to 104°, 80° being the summer average and 35° that of winter. In June, July, and August the rains descend with great violence, dense fogs occur, and typhoons of fearful violence strew the shores with wreckage and cover the interior with desolation. In lat. 32° N. ice is formed of nearly an inch in thickness, and in lat. 40° obtains such consistency that the rivers may safely be crossed by the pedestrian. Southerly winds are prevalent during the months from March to September, blowing almost with the constancy of a monsoon, as well over the open ocean as over the more secluded waters of the Japanese Sea and the Gulf of Tartary.

Vegetation.—From the semi-tropical, semi-temperate character of its climate, Japan possesses a singularly rich and varied flora. In the north flourish vast forests of oak and pine; in the south the sago palm, the tree-fern, the banana, the bamboo, bignonia, and myrtle delight the eye with their graces of form and wealth of colour. The landscapes are also diversified by rich clusters of hydrangeas, camellias, japonicas, and azaleas, which here attain a luxuriance and a beauty unknown in Europe. Among the trees which clothe the mountain sides are the chestnut, maple, beech, elm, lime, elder, and cypress. Japan also possesses a peculiar cedar, *Cryptomeria Japonica*, which borders the highroads with stately avenues, and frequently attains to an altitude of 130 feet. The upper branches, uniting from either side, constitute a perfect canopy of foliage. The orange, pomegranate, pear, apricot, and peach, though now common in Japan, and of great excellence, with many other fruits and garden plants, are of foreign extraction, and were probably introduced from Corea and China. The Camphor Tree (*Laurus camphora*), found in most of the forests, occasionally attains to huge dimensions. One, visited by Kämpfer, in the island of Kuishiu, is still standing, and supposed to be upwards of 1000 years old. The Lacquer or Varnish Tree (*Rhus vernificera*) furnishes the gum with which the Japanese heighten the brilliancy of their papier-mâché articles. Hence arose the term *japanning*. The Wax-tree (*Rhus succedanea*) yields seeds from which wax for candles is obtained by compression. It thrives best on barren and stony ground, ripens in its eighteenth year, and afterwards declines. Another valuable tree is the Paper Mulberry (*Broussonetia papyrifera*),

whose bark supplies the paper of which the Japanese make such extensive use. In the south the sugar-cane is successfully cultivated. Rice yields two crops annually, and is the staple food of the majority of the population. Tea of a superior quality is largely grown, and cotton, tobacco, ginger, melons, buckwheat, pumpkins, and cucumbers are also objects of culture; for the industry of the Japanese, like the persevering ingenuity of the Chinese, compels the most ungrateful soil to yield a liberal return.

Zoology.—The bear is said to haunt the woods of Yesso, and in the north of Nippon linger a few wolves and boars; these, with foxes and hyænas, are the only wild animals that Japan possesses. Those of a tamer class are not very numerous, owing to the great extent of ground occupied by the agriculturists; but some species are protected by the laws, and others by the partial abstinence of the inhabitants from animal food. The stork is as sacred in Japan as in Holland. Deer run freely about the public streets. Buffaloes and zebus abound, but are only employed for draught and burden. Among the domesticated quadrupeds are horses, cows, dogs, pigs, and cats. Birds are numerous, and include geese, ducks, teal, pheasants, ravens, larks, pigeons, and pelicans; snakes are commonly met with, and one species, the Oubani, grows to an enormous size. There are also tortoises and lizards, scorpions, centipedes, and other genera of the insect world. Silkworm breeding is extensively carried on, and large quantities of silk are exported to Europe; but the quality has greatly deteriorated of late years, in consequence of the bad reeling and the immense exportation of the best eggs to France and Italy, occasioned by the dearth of good seed in those countries owing to the prevalence of the disease called pebrine. The seas and rivers teem with wholesome fish, which forms an important article of food with both upper and lower classes.

Manners and Customs, System of Government, &c.—The government is an absolute monarchy, tempered by the Daijō-Kwan or Great Council, which is nearly as old as the monarchy itself, and whose members, under the new state of things, mainly form the heads of the executive departments, which correspond in name and organization to the ministries of Europe. Then there is the Gen-rōin, or Senate, established in 1875, to deliberate on legislative matters, its decisions being subject to confirmation by the cabinet council and sanctioned by the sovereign. The number of senators is at present thirty-seven. Further, there is the Sanji-in, or Council of State, created in 1881. Its functions are to initiate and frame bills, and discuss matters transmitted by the executive departments, and also to hear and decide cases relating to administrative questions. Each of the forty-seven districts (three Fus and forty-four Kens) has its governor; while each district is subdivided into counties (Gun), and cities or boroughs (Ku), each with its chief (Cho), who manages local affairs. The attempt at a Parliament in 1869 failed, though the emperor has promised to formally introduce Parliamentary government in 1890. Still Japan is not without representative institutions. Since 1872 the provincial governors have been several times summoned to Tokio to discuss matters relating mainly to the land tax; while the provincial assemblies, which deal with certain local matters, are formed of representatives chosen by all male citizens who have attained the age of twenty years and pay £1 of land tax annually. Of such electors there are 1,800,000.

Previous to the changes of 1869, which placed all power in the hands of the Mikado, a large part of the administrative authority rested with the daimios, the feudal proprietors of the soil. These numbered 266, with incomes varying from £15,000 to £915,500, and the territory of each formed a sovereignty within itself, with, in many cases, large bodies of troops.

The criminal laws of the empire are most sanguinary in

principle, and appear to have been written in blood; but practically they are now modified and ameliorated by the discretion of the local magistrates. The most remarkable punishment is that of the "happy despatch," HAKRI KARI, in which the offender becomes his own executioner, by making two cross cuts on the abdomen with a sword or sharp-pointed knife. The Japanese police are very strict in their maintenance of order, and are also charged with the registration of births, deaths, and marriages.

The extraordinary changes which have come over the country since 1869 are described by a Japanese minister as an awakening from "the sleep of a thousand years." In material civilization, however, the people of Japan during that time had neither been stationary nor behind the rest of the world. No land had been better cultivated or made more productive. Added to this, certainly no nation was ever better governed on a theocratic system and by a dominant class, or has ever been more orderly, industrious, and contented than the Japanese during the two centuries and a half preceding the advent of foreigners in 1854. In the arts of life and skilled labour dedicated to decorative and artistic as well as utilitarian purposes, they had in some respects achieved a degree of perfection which at this day has not been surpassed in Europe. Their silks, embroidery, porcelain, bronzes, and artistic work in metals are still the envy of the most advanced workers in the same materials in the western world. Mr. Audsley's work on the "Ceramic Art of Japan" (London, 1875) gave some idea of the wonderful perfection in this, among other arts, to which the Japanese had attained previous to the opening of the country to modern "civilization." In fact, the recent introduction and wide popularity of Oriental works of art must be reckoned as one of the most powerful causes of the present improvement in popular taste, and consequent advance in the arts of design in our own country. Although it is the offspring of Chinese art, and frequently it is difficult to distinguish Japanese from Chinese objects, yet there are features in the Japanese style which render it infinitely superior to the Chinese—partly their instinctive avoidance of the grotesque, but mainly their progressive spirit, especially the return to nature for inspiration, and the characteristic force as well as purity with which they treat natural objects, such as the figures of flowers and animals. A comparison of Nos. 1, 3, 11, and 13 in our Plate (JAPAN, DECORATIVE ART OF) with No. 7, which is a Chinese representation of a butterfly hovering over a flower, will best explain this difference. Most of the figures in the Plate are copied from Japanese examples of great age, and serve to show the versatility of Japanese designers and some of the means they employ and effects they aim at. No. 4 is especially noteworthy. It is the famous *torii*, which travellers in Japan observe so constantly placed on all terminal tiles of roofs or walls which are not decorated with a family badge. It is supposed in the Buddhist community to represent a heaping up of myriads of good influences—good luck, long life, and so on; but hitherto it has been impossible to trace its origin. Our own huge use of the horseshoe nailed over the door "for luck" in country places may give an idea of the Japanese use of the *tomoyé*. It is incomparably the most common device in the empire.

In physiognomy the people correspond to the Mongolian races, and are probably sprung from them, with an admixture of Malay blood. Their eyes are small, dark, and twinkling; their eyebrows heavy and arched; their complexion varies from a light olive hue to a deep copper; in limbs they are robust and muscular; in stature below the ordinary standard. European fashions of dress, hair, and personal appearance have become very general, and to some extent compulsory, in all ranks of society.

Education, which has always been very general in Japan, has made very rapid strides since 1872. In that year a

law was passed which provided for the establishment of 53,000 schools, or one for every 600 of the computed inhabitants of Japan; and the provisions of this law have been very largely complied with. The instruction given varies with circumstances, but it is in all cases conveyed upon the European or the American principle, and the schoolrooms and furniture resemble those common in English board schools. Numerous European professors are engaged by the government in promoting the higher branches of education; and to facilitate this by native agency, and the better to acquire a knowledge of foreign languages, the government, at the public expense, maintains a large number of Japanese students at the various colleges and universities of Europe and America. The education given at all government schools and colleges is entirely secular, "as far as is consistent with the fundamental tenets of the Shinto faith." The Japanese pay eminent respect to their women, but seem rather to neglect the subject of female education. Among other western institutions introduced is a poor law, dating from 1874, in accordance with which government gives over nine bushels of rice annually to every one over seventy years or under fifteen who cannot work, and also to foundlings until they reach the age of thirteen. The people have a love of order and regularity, shown not only in the systematic arrangement of the social hierarchy, but even in the building of their cities. For example, the plan of Osaka is almost as regular as a chess-board. They are also a cleanly people: the inhabitants of certain European countries might imitate them in this respect with advantage. The hot bath is a daily necessary of life in Japan, but it is remarkable that the Japanese never bathe in the sea for pleasure.

Rendall, in his "Memorials of the Empire of Japan," pronounced an opinion on the Japanese character which seems both impartial and accurate. "They carry their notions of honour," he says, "to the verge of fanaticism, but they are haughty, vindictive, and licentious. On the other hand, brawlers, braggarts, and backbiters are held in the most supreme contempt. The slightest infraction of truth is punished with severity; they are open-hearted, hospitable, and, as friends, faithful to death. It is represented that there is no peril a Japanese will not encounter to serve a friend; that no torture will compel him to betray a trust; and that even the stranger who seeks aid will be protected."

A later writer, who speaks heartily of the many virtues of the Japanese and tenderly of their failings, points out very clearly and decidedly the dangers which beset this interesting people in the course on which they have entered. Their old civilization, while it had some manly features, was in many respects incomplete, to use a mild term. In their everyday occupations and amusements the people have many of the habits and characteristics of children, and these childish tendencies, it must be admitted, they have shown to some extent in their attempt to adopt a civilization to which all their previous evolution is alien. But, however this may be, the Japanese are remarkably ingenious, even if it may seem that their ingenuity sometimes takes rather a trifling form. As an instance, the remarkable way in which they have overcome the difficulty presented by the frequent occurrence of earthquakes, by the erection of lofty *pagodas*, is worthy of mention. The sides are erected of timber used in quantities that seem at first sight to confer a needless strength. But this is soon seen to be a mistake, for they have to support an enormous quantity of timber suspended from the top of the building and reaching to within an inch of the ground, and hanging free from the sides like the clapper of a bell. This enormous pendulum, by its clever construction, is enabled to retain its vertical position even during the continuance of earthquake shocks, and by its swinging the centre of gravity is kept within its base.

Few changes are more striking than that between the former and the present attitude of the Japanese people towards foreigners. Jealousy of the foreigner, however, is still found, though under a somewhat new phase, for the Japanese now indignantly repudiate the assertion of foreign superiority in civil and commercial pursuits. They wish to obtain the newly-developed riches of their land for themselves, and they are succeeding to a most remarkable extent. They were sufficiently conversant with the laws of political economy to know that for the full development of the resources of their country both skilled management and labour and capital were necessary. They were deficient in these elements, and their object was to arrive at a satisfactory solution of the problem of obtaining the requisite foreign capital and skill, and still retain the profits to be derived from the industrial development of the country for the benefit of the Japanese. Foreigners consequently found the various branches of trade in the hands of an elaborate system of guilds, or trade "corporations," whose privileges and monopolies offered serious impediments. There is now scarcely a single branch of manufacture, from sewing-machines to bricks, and from cotton goods to aerated waters, which has not been introduced with thriving success into the country.

The army is raised on the German model, and a navy of respectable dimensions is fast being formed under English direction. The annual revenue and expenditure are each between £13,000,000 and £14,000,000. There is a public debt of nearly £70,000,000, of which nearly £2,000,000 is due to foreigners, chiefly English. It was raised for the construction of railways and other reproductive works. The finances generally are organized upon a sound basis; a national mint has been established, a new currency introduced, and the taxes, formerly paid in kind, must now be paid in coin. The interest and expenses of the national debt (apart from its redemption) form the largest item in the budget of 1884, amounting to over £2,900,000. Of the total revenue 57 per cent. is derived from the land-tax.

A very important commercial treaty was concluded at Yeddo in 1867, between the Japanese government and the representatives of Great Britain, France, the United States, and Holland. It established a new tariff, negotiated on the principle of a specific rate, calculated on a basis of 5 per cent. of the value both of imports and exports, and has resulted in a large increase to the trade of the country. The Japanese government undertook to establish immediately a bonded warehouse system, enabling the foreign merchant to re-export unsalable goods without the payment of duty. The Japanese government have since lighted and buoyed the approaches.

The foreign commerce of Japan is chiefly with the United States, France, China, and the United Kingdom. The chief articles of export are tea, silk, and lacquered ware, and the imports are cotton and cotton manufactures, sugar, and woollen goods. The value of the imports is about £6,000,000 per annum, and of the exports £7,500,000. The commercial intercourse with the United Kingdom in recent years has been as follows:—

	Exports from Japan to Great Britain.	Imports of British Home Products into Japan.
1882, . . .	£718,915	£2,119,151
1883, . . .	661,912	2,276,573
1884, . . .	666,847	2,256,739

The contagion of example and other influences have effected great changes of late years in the character and condition even of the artisan class. Nothing more strikingly exemplifies this perhaps than the growing taste for brick or stone-faced houses. This has brought forward a class of men who make a speciality of the work—stonemasons, bricklayers, blacksmiths, &c., who, from an inferior

position, have pushed themselves into the front ranks. A first-class hand will now earn his 5s. a day—a fabulous sum in comparison with what the best workmen dreamed of obtaining in the “good old days.”

Religion.—Shintuism, or the worship of that sun-goddess from whom the Mikado was supposed to be lineally descended, was the ancient religion of the Japanese, and was non-idolatrous. Engrafted upon the Shintu, however, were Confucianism and Buddhism—both derived from China. The reforming ministry of 1868 turned its attention to the national religion; and while refraining from proscribing Buddhism altogether, it ordered the destruction of all the Buddhist symbols and images in the temples which had formerly been consecrated to Shintu. The tenets of the present religion form the basis of the allegiance due from the subject to the sovereign. It is held that the Mikado is of divine descent, and by virtue of this descent he claims loyalty and obedience as his due.

It is worth notice that the representatives of Shintuism have hopes of propagating their tenets among Englishmen, and that the result of the visit to England of a representative of the Japanese government—a most enlightened and spiritually-minded man, of very liberal views, to report on the influence of the Christian religion on public morals—was that he reported that Christianity was far more powerless than either Shintu or Buddhism in preventing crime, and particularly drunkenness, and it was therefore resolved to make no change in the public religion of Japan. Foreign residents are permitted the free exercise of their own religions, but the propagation of them among the native Japanese is regarded with jealousy.

Many of the Japanese temples, of which there are no less than 96,000, are of great extent and magnificence. One of the largest and most celebrated in Yeddo is the temple of Asava, situated in one of the most populous quarters of the city. In every temple may be observed the same stereotyped features—an altar, an image, chandeliers, painting, and trumpety decorations of artificial flowers. An account of the “Revival of Pure Shintu,” by Mr. Satow, printed for private circulation in 1875, throws much light upon this ancient creed. From this it appears that the religious duties of the Japanese consist chiefly in worship at the temples, where they display a very reverent behaviour, and the observance of festivals, pilgrimages, periodical adoration of tutelary divinities, reverence to parents, obedience to magistrates, and offerings at the tombs of their ancestors. Worship of ancestors is a cardinal point in the creed. Devotion to their memory is the mainspring of all virtues. No one who discharges his duty to them will ever be disrespectful to the gods or to his living parents.

Language.—In the same way as English is full of Latin and Greek words, preferring to adopt these exotics rather than to revive its own obsolete words or extend its own speech, so Japanese has been for fifteen centuries absorbing the Chinese vocabulary, until it has almost included the entire Chinese language within its own tongue. Nevertheless Japanese has a very distinct character of its own. It is not Mongolian, although they who speak it are of so pronounced a Mongol type. It is not monosyllabic but agglutinative. Its structure is of the simplest kind; hardly any distinction exists between noun and verb; nor has it any definite flexion, preferring, like ourselves, the use of particles and auxiliaries. Pronouns are almost crowded out by the large use of complimentary titles—a state of speech which our own parliamentary debates will dimly make intelligible: “The right honourable gentleman said that the noble lord, in alluding to the gallant member who spoke before the senior member for South Lancashire, used these words,” &c. But as it is considered polite to use Chinese phrases, Japanese becomes less and less used in literary work. It is very agreeable to hear. Two kinds of writing

are used, one practically the Chinese system of ideographic symbols, the other an alphabet of forty-seven signs with a few complete monosyllabic symbols. This alphabet is over 1000 years old. Recently attempts have been strenuously made to introduce European letters, and there seems little doubt but that this will be thoroughly accomplished in the immediate future.

History.—The remarkable events of the last few years have thrown much light on the mystery in which Japan has been for ages enshrouded. The country is now shown to have a written history stretching uninterruptedly over twenty-six centuries. Its sovereigns have formed one unbroken dynasty since 660 B.C., its first ruler having been contemporary with Nebuchadnezzar and Tullus Hostilius. Its present emperor is the 122nd of his race. Its principles of action remained virtually unchanged for twenty-five centuries, the manners and characters of its people being almost more striking than its ancient lineage. After thus persistently shutting itself out from all contact with the world, it suddenly abandoned its traditions, and is seeking to change its whole condition, is adopting European laws and habits, and is taking a place among the nations. A most singular reaction of public feeling suddenly swept away prejudices and institutions which seemed immovable, and replaced them by an organization and a tendency in contradiction to the experience and teaching of the past.

The empire was unknown to Europeans until discovered by the Portuguese about the year 1452. Christianity was then introduced by the Jesuit missionaries, under the auspices of the famous St. Francis Xavier; but owing to their interference with state affairs the enterprise terminated in a most tragical catastrophe. A persecution followed of forty years' duration, and was only ended by a massacre which left not one Christian alive in the empire.

In 1611 the Dutch contrived to obtain permission to establish a factory at Firands. They were then at war with Spain, and Portugal was at that time under Spanish government; and the Hollanders, by their intrigues, soon contrived to oust the Portuguese from the empire and monopolize the whole of its foreign commerce. In the reign of Elizabeth an English mariner, named William Adams, being wrecked on the coast of Japan, was detained a prisoner for life, but obtained such influence over the Tycoon, that he succeeded in opening up a commercial intercourse between Japan and England. For several years the English flag was constantly seen in the Japanese ports; but during the reign of James I. the permission was withdrawn, and the Japanese ports rigorously closed against all vessels but those of the Dutch.

European traders remained thus excluded from the commerce of Japan until 1854, when it was thrown open to the great Western powers by a treaty enforced by the American squadron under Commodore Perry. It was then decided that the two imperial ports of Nagasaki and Hakodadi should be free to the vessels of all nations for commercial purposes, to refit, reprovise, and establish depots of coal. In 1858 the Americans negotiated a treaty on a much more favourable basis, inasmuch as it provided for a resident minister at the court of Yeddo, and for the opening of the ports of Kanagawa, Nagasaki, and Hakodadi, while the two principal cities, Yeddo and Osaka, were also released from the oblivion of centuries. In the summer of the same year the Earl of Elgin, on the part of Great Britain, and Baron Gros, on behalf of France, having successfully concluded a mission to the Chinese court, proceeded to Japan with a powerful fleet, and negotiated a treaty which conferred on European powers the privileges previously conceded to the United States. It was signed in due form at Yeddo, on 26th August, 1858.

The treaty of Lord Elgin was negotiated with the Japanese Shogoon in the belief that he was the sole temporal sovereign of the islands, while the sway of the Mikado was purely

spiritual. The Shogoon himself so far presumed upon the ignorance of the barbarians as to call himself Tycoon, a title implying sovereignty, and dropped that of Shogoon, which, translated, is simply commander-in-chief. Although, however, the Shogoon was theoretically only the general of the sovereign, yet in reality he was sovereign of the richest and most populous districts of Japan. It is true he only exercised a feudal superiority over the great daimios or princes whose territories were included in his dominions; but from the seventeenth century, when the commander-in-chief of the day asserted his independence—and since which time the dignity had been transmitted as hereditary—the daimios of the southern districts appear to have recognized him as the head of their order, to whom they owed feudal obedience. Meanwhile the Mikado lived apart in his holy city of Kioto, surrounded by his court nobles, and exercising but small influence on the politics of Japan.

In 1861 serious differences arose between some of the daimios and the Shogoon, ostensibly on account of the concessions the latter had made to the foreign barbarians, and a state of civil war commenced. A league was formed by some of the more powerful daimios, who sought to sanctify their cause by invoking the divine right of the Mikado, an attribute which had long fallen into abeyance so far as temporal sovereignty went. They obtained a decree in their favour from the "son of the gods," and then brought their troops into the field to support the authority of the veritable monarch. The Shogoon for the time had the advantage, and the daimios had the additional misfortune to incur British displeasure by the murder of several of our countrymen. A British squadron, under Admiral Kuper, bombarded and destroyed Kagosima and Simonsaki, the cities of the offending daimios. This proof of European power appears to have changed the face of affairs, and thenceforward the English came to a good understanding with the daimios, who had professed themselves their most determined enemies. The Shogoon died at the close of 1866, and the Mikado some months later. The latter was succeeded by his son, the present sovereign, then a boy of eleven, and soon after the daimios succeeded in completely defeating the new Shogoon, whose office they declared abolished, and proclaimed the undivided sovereignty of the Mikado. This was the great revolution of 1868, which originated the new era of Japanese politics.

The Shogoon having fallen, the bonds which had held the great feudatories together during so many centuries were broken, and there was left no common superior, except in so far as the Mikado might claim a titular supremacy, which he had no means at his command to enforce. The crisis was momentous, and for a time it seemed as if the country was to be decentralized even more than before, as if thenceforth each daimio would set up for himself, and as if Japan must be portioned out among so many petty potentates, who would wage perpetual war until the stronger should swallow the weaker. The surprising event which followed showed that the daimios had the patriotism to foresee and the wisdom to avert such a calamity. In a petition to the Mikado they laid down their power at his feet, and placed their territories and their soldiers at his absolute disposal. Nor was their offer by any means a mere figure of speech. The newly-formed ministry of the Mikado took them literally at their word. Their very title of daimios was abolished, their feudal towns and territories were converted by imperial mandate into free towns and territories holding directly of the crown; the ex-daimios were commanded to come and live in residence at the court, while functionaries from Yeddo were sent to replace them as governors and prefects in their hereditary provinces. In a word, the feudal system was at one stroke swept away, and the Mikado appropriated to himself all the authority which his nobles had exercised irresponsibly from time immemorial; and he was obeyed.

The passion for innovation has been carried to rather absurd extremes—imperial decrees, for instance, having abolished mats in the houses, and enforced the European mode of wearing the hair under penalties. Of greater importance was the inauguration of numerous public works of utility, the formation of factories, the building of public offices and barracks, the organization of a postal service, the making of roads and embanking of rivers, the construction of railways and telegraphs, and the erection of lighthouses and improvement of harbours to facilitate the trade and commerce of the country.

"Japan: its History, Traditions, and Religions, with the Narrative of a Visit in 1879," by Sir E. J. Reed (London, 1880); "Japan: its Architecture, Art, and Art Manufactures," by Christopher Dresser (London, 1882); "A Handbook for Travellers in Central and Northern Japan," by E. M. Satow and A. G. S. Hawes (London, 1882); "Japan: Travels and Researches, undertaken at the cost of the Prussian Government," by J. J. Rein (Lond., 1884).

JAPAN'NING is the art of producing a highly varnished surface on wood, metal, or other hard substance, sometimes of one colour only, but more commonly figured and ornamented. The process has received its name from that of the island of Japan, whence articles so varnished were first brought to Europe; though the manufacture is also extensively practised by the Chinese, Siamese, Burmese, and other nations of Eastern Asia, among whom it was suggested most probably by the possession of a tree which abounds with little preparation a beautiful varnish exceedingly well adapted for the purpose, and which hardens better than those prepared in Europe.

The appearance of japanned work is as various as the taste and fancy of the artists employed upon it. Sometimes it is a plain black or red, with a gilded or painted border; or it is an imitation of marble, of fine-grained or rare wood, or of tortoise-shell; sometimes a drawing, with high finish, brilliant colour, and showy patterns; and occasionally fine copper-plate engravings are applied to a japanned surface with good effect. In all cases the work is highly polished and varnished. Japanning is applied to ladies' work-boxes and work-tables, to toilet-boxes, cabinets, tea-caddies, fire-screens, tea-trays, bread-baskets, snuffers and trays, candlesticks, and a variety of other articles.

The japanning material consists of anime or copal varnish, mixed with different substances, according to the intended colour of the ground. After being varnished with this mixture the articles are heated in an oven till perfectly dry. In the better class of goods the process is repeated several times to insure a good ground. When thoroughly dry, after the last application, they are painted and gilded as required, after which nothing remains but the finishing. This is a very simple process; the workman chooses a suitable varnish, and passes it over the work with a brush several times, until he judges the coating to be thick enough to bear the polish. It is an important precaution not to begin the varnishing until the preceding work is thoroughly dry, and to dry perfectly each coat. When thick enough, the varnish is polished by rubbing it with a rag dipped in finely powdered tripoli or rotten-stone. Towards the end of the operation a little oil is also applied to the rag; and the work is completed by rubbing with oil alone, to clear off the powder or any other impurity. In the manufacture of *papier mâché* the process is very similar to japanning. Lacquering is also done in the same way, but this word is more generally applied to metal articles. Birmingham is the great centre of this manufacture. It is there carried on to a very great extent. It is also prosecuted with spirit and success at Bilston and Wolverhampton.

JARGOON' is a colourless and smoky-tinted variety of Zircon (ZrO_2SiO_2); it occurs mostly in Ceylon, and as it somewhat resembles the diamond, although of much

inferior hardness, it is sometimes sold as an inferior diamond.

JAROSLAV, a government of Russia in Europe, bounded by Vologda on the N., Kostroma on the E., Vladimir on the S., and Tver on the W.; greatest length and breadth, 160 miles and 140 miles respectively. It is traversed by the Volga, which receives in this government its tributaries the Mologa and Sheksna. Possessing a healthy climate and a pure atmosphere, it is yet subject to very long and unusually severe winters. Almost all the land is cultivated, although it seems to be far from fertile; but apples and cherries are produced in great abundance in the south; and there are manufactures of woollens, linens, cottons, &c. Its chief export is fish, with which the Volga and its tributaries abound in this government. The area is 14,000 square miles; population, 1,050,000.

JAROSLAV, the capital of the above government, is situated on the right bank of the Volga, where it is joined by the Kotorosl. It is defended by a fort, and situated on slightly elevated ground. With a superior college, it possesses manufactures of linen and silk goods, leather, soap, &c., and a considerable transit trade, especially in leather and linen. It was founded in 1025, by Jaroslav (from whom it derives its name), the son of Vladimir the Great, but it is indebted to Peter the Great for its present importance. Population, 20,000.

JARROW-ON-TYNE, a municipal borough of England, situated on the Tyne, 7 miles south-east of Newcastle and 316 miles from London by the Great Northern Railway. The chief buildings are, the parish church of St. Paul's, which stands on the site of the church which first received the remains of the Venerable Bede, who was a native of the village, Christ Church, several dissenting chapels, and a Roman Catholic place of worship, the town-hall, and an hospital. There is also a public park. The Tyne Docks, which are situated here, cover with their quays and buildings about 300 acres. There are manufactures of paper and chemicals, large iron shipbuilding yards and iron foundries, but coal mining and shipping chiefly employ the inhabitants. The corporation, created in 1875, consists of six aldermen and eighteen councillors, from whom the mayor is chosen. The population in 1881 was 25,296.

JASHER, **BOOK OF**, or the "Book of the Upright," is twice referred to in the Old Testament as a work of authority (Josh. x. 13; 2 Sam. i. 18). Many conjectures have been formed concerning the author and contents of this book, but the work appears to have been lost before the time of the Babylonish captivity. In the year 1751 a pretended translation was published by a printer of the name of Ilive. In 1855 Dr. J. W. Donaldson published a work in which he endeavoured to prove that none of the books of the Old Testament were written before the time of Solomon, and then only as fragments, which he thinks formed the Book of Jasher, and that these fragments were afterwards worked up into the shape of the existing books, at least as far as the Psalms. This theory was combated by the Rev. J. J. S. Perowne and others, and it has met with but little support either in Germany or England.

JAS'MINE or **JES'SAMINE** is the common name for the genus of plants *Jasminum*, which gives its name to the tribe *Jasminæ* of the olive order *OLEACEÆ*. The Common White Jasmine (*Jasminum officinale*) is a native of the East, and was introduced into England as long ago as the middle of the sixteenth century. The fragrance of jasmine is peculiar, and has not yet been artificially imitated. The perfume can be extracted from the flowers, but for this purpose the Spanish Jasmine (*Jasminum grandiflorum*), a native of Tobago, is grafted on the common jasmine, so as to combine its larger and more fragrant flowers with a self-supporting stock. The blossoms are spread on cotton cloths saturated with olive or ben oil, or in glass trays covered with a layer (half an inch thick) of purified lard.

Jasminum Sambac is celebrated by Persian and Arabian poets for the exquisite fragrance of its white flowers; they are used in China to scent tea, and double flowers are offered in India to Vishnu. Some species have yellow flowers. There are about 100 species, one native in south Europe, the rest in Asia, Africa, or Australia. They are all shrubs, often climbers. They are distinguished by the fleshy, indehiscent fruit, with erect exalbuminous seeds.

JASON (Gr. *Iasôn*), the leader of the Argonauts, was one of the *Eolids* of Thessaly. His uncle, who had usurped the kingdom of Iolkos, caused Jason to be thrown out when an infant to die; but the boy was saved and taken to the Centaur Cheiron, who brought him up. When he had arrived at manhood Jason learnt his real state, and at once set out to claim his kingdom. Crossing the river Enipeus, swollen in flood, with the help of the goddess Hêra, he lost one sandal. Now the king, Pelias, had been warned against resisting a one-sandalled man, and consequently when the youth appeared his fortitude gave way and he agreed to descend from the throne, provided only Jason should "earn his spurs" by some great enterprise. He proposed therefore that he should fetch the golden fleece from Kolkhis (or Colchis). Jason at once agreed to attempt this. The journey is narrated in the article **ARGONAUTS**, with the successful issue, including the marriage of Jason with Medea (Mêdeia), the daughter of the King of Kolkhis, and her flight with her husband to Greece. But on presenting the golden fleece, gained at such terrible cost, Jason found Pelias determined now to attempt to retain the throne. Jason also discovered that his father, the rightful sovereign of Iolkos, had been put to death by Pelias. He burned for revenge, but was not strong enough to obtain it. Under these circumstances he applied for help to Medea, who was skilled in magic. Pelias was old, and Medea, feigning acquiescence in his sovereignty, showed his daughters a magical potion, in which when she had boiled a ram, killed and cut into pieces, it came out not only alive and whole, but as a young lamb. The daughters of Pelias, hoping to restore youth to their father, killed him and lacked him to pieces, hoping for a like result, of course in vain. Nevertheless Jason did not get his kingdom, for the people, under the son of Pelias, rose against the magicians and drove them away. They went to Corinth and ruled peaceably for ten years. Jason then fell in love with Kreousa (Lat. *Creusa*), daughter of Kreôn, supreme king of the country. Medea, stung by jealousy, dashed out her children's brains, set fire to the palace, and murdered Kreousa with a poisoned robe, flying off to Athens in a car drawn by dragons. At Athens she lived with Ægeus some time, but eventually returned in her car to Kolkhis. Jason retiring in the extremity of grief to the sacred grove where reposed the ship Argo, was crushed by the heavy stern, which broke away from the hull and fell upon him.

JASON (Gr. *Iasôn*), Tyrant of Phææ, and Tagos, or supreme military chief, of Thessaly, succeeded his father in the sovereignty in B.C. 395, and soon became master of the whole of Thessaly. As Thebes and Sparta were fighting a duel to the death, Jason rose to almost supreme power in Greece. He was very friendly with Timotheos, Pelopidas, Isokrates, &c., making it his business to cultivate the friendship of all the best men in Greece. As a general he was very skilful, and showed promise of brilliant abilities. Just as his ambition was on the point of being gratified, he fell by assassination at a banquet B.C. 370.

JASPER (Gr. *jaspis*) is an impure opaque crypto-crystalline variety of quartz, containing argillaceous matter and red or yellow oxide of iron; it also occurs green. The yellow varieties are converted to red on heating, by the expulsion of water from the hydrated yellow iron oxide. Jasper is quite opaque, hard, and was much used as a seal-stone and for purposes of sculpture. The most valued

were the black and dark-green varieties. Jasper was regarded as symbolical of St. Peter in the middle ages. It is mentioned in the Revelation of St. John as the stone forming one of the courses in the New Jerusalem, and it is also mentioned as the third stone in the second row of the Jewish high-priest's ephod.

The most important varieties of jasper are, ribbon jasper, in which there are broad stripes of green, yellow, gray, red, brown; Egyptian jasper, where these bands occur in irregular concentric zones; ruin jasper, when ruin-like markings occur on a dark ground. Porcelain jasper is clay or slate altered or baked by igneous rocks.

JASSY or **YASSY**, a town certainly dating back to the fourteenth century, and claiming to have existed in the time of the Roman Empire as *Jassiorum Municipium*, formerly capital of the principality of Moldavia, and now the chief town of a district in Roumania, stands on the Baglui, a tributary of the Pruth, partly on a hill, and partly on a plain near the river, 160 miles west-north-west of Odessa. The country around is rich and fertile, and the city had formerly a very pretty appearance, the houses being interspersed with gardens and plantations; but great part of it was burned in 1822, and it has been only partially rebuilt in an inferior style. The citadel, on an eminence opposite the former palace of the hospodar, is the only defence of the place. Jassy is the seat of an archbishop and a prefect, and has several churches—Greek, Lutheran, and Roman Catholic; several convents, and synagogues, a gymnasium, girls' industrial school, museum, and numerous educational establishments in addition to the university, and a large hospital. A great improvement on the condition of the town has been brought about by the introduction of asphalt as paving in the principal streets. There is a considerable trade, in the hands of the Jews, in corn, wax, honey, wine, tallow, hides, and canvas. Population, 90,000.

JATS, the name given to one of the races in India, estimated to form two-fifths of the population of the Punjab, half that of the Rajput States, and which is also widely scattered throughout the North-western Provinces. Orientalists are not agreed as to the probable origin of this people, but from considerations derived from the study of their language some scholars are disposed to regard them as the earliest Aryan settlers in the valley of the Indus. They are chiefly devoted to agriculture and to the breeding of cattle and camels, being very skilful in the latter department of industry. Some of them follow the vocation of itinerant traders, and travel far beyond the confines of India with their wares. They have no distinctive religion, but follow that of the district where they are located, the forms chiefly adopted being Brahmanism (without caste), Mohammedanism, and the Sikh religion. Among the different theories that have been propounded to account for the origin of the gypsies, one of the most reasonable is that which regards them as derived from the Jats of India.

JAUNDICE and **ICTERUS**, names given in medicine to that condition in which the excretion of the bile being prevented, it is retained in the blood or reabsorbed and diffused throughout the system. Anything which obstructs the main trunk of the bile-ducts, as gall-stones, round worms, or other foreign bodies filling its canal, morbid alterations of the liver or duodenum, or of the duct itself, tumours or enlargements of adjacent organs, and inflammation of the liver, will produce jaundice. It may also arise from mental causes, and extreme anger, fear, or anxiety are sometimes quickly followed by the appearance of jaundice. The most frequent cause, however, is from the secretion of the bile being suppressed or deficient through some temporary disorder of the liver, and in the majority of cases the prognosis is favourable. The symptoms of jaundice are the appearance of a yellow tinge in the whites of the eyes, the roots of the nails, then in the

skin of the face and neck, and lastly of the whole body. The urine becomes of the colour of saffron, or dark red, or even brownish-black, while the motions are pale or drab coloured, and of unusually offensive odour. There is also considerable derangement of digestion, bringing on flatulence and constipation, loss of appetite, a bitter taste in the mouth, headache and vomiting, and accompanied by great depression of spirits.

It is impossible that any one mode of treatment should be adopted for a symptom depending on such varied causes. Where the obstruction is mechanical, the jaundice is of course curable only by removal of its evident cause; and in organic disease of the liver it is but the symptom of a more important disease to which the treatment must be directed. In the more common cases arising from congestion of the liver, treatment consists in limiting the diet to such articles as are light and easy of digestion, and the administration of suitable purgatives, such as rhubarb, podophyllum, and mercury, or the aperient mineral waters. Diaphoretics and diuretics, to promote the action of the skin and kidneys, are also useful; and inspissated ox-gall, in doses of from 5 to 10 grains, inclosed in capsules, is sometimes given to assist the digestive process. In favourable cases recovery usually takes place within a fortnight or three weeks, but there is often a good deal of weakness for a considerable period afterwards.

JAVA, one of the Greater Sunda Islands, belonging to Holland, is situated between 5° 52' and 8° 46' S. lat., and between 105° 11' and 114° 34' E. lon. The length is 628 miles; the breadth varies from 40 to 130 miles. The area, including Madura, is 51,961 square miles, and the population in 1881 was 19,992,012. The shores are washed by the Indian Ocean, the Java Sea, the Straits of Sunda, and the Straits of Bali. The island of Madura, almost close to Java, is 91 miles long, and 31 miles wide in the widest part.

Surface and Soil.—The southern coast in its whole extent is high and steep. It runs in a continuous line, with few indentations, and those not deep. Consequently there are few places which have good anchorage. The hilly country, which is contiguous to the southern coast, rises rapidly as we advance inland, and attains towards the middle of the island a mean elevation of more than 1000 feet, where it extends in elevated plains with an uneven or hilly surface. Several ridges traverse this elevated region, having numerous volcanic peaks, some of which attain an elevation of from 10,000 to 12,000 feet, and the loftiest, Semeru, 12,238 feet. The hilly district contains also some extensive plains and fertile valleys, inclosed by the peaked ridges. This elevated area terminates to the north in rather a steep slope, and between it and the Java Sea extends a flat country, which descends imperceptibly from the foot of the hills to the very shores, where it is frequently covered with swamps. The northern coast is lined by numerous small islands and marked by many projecting points and headlands. Accordingly harbours abound, and the adjacent seas are navigated by numerous vessels of small tonnage.

The soil of Java is generally deep and rich. The best soils are alluvial, along the beds of the rivers, but the fertility of the whole island is far above the average. Java is watered by numerous rivers, but few of them have a considerable course on account of the comparative narrowness of the island. Five or six are navigable at all times to a distance of some miles from the coast, but large deposits of mud are going on all along the coast. The rest, in number many hundreds, are used to irrigate the fields. The chief rivers are the Solo and the Kediri or Surabaya. There are swamps, but no lakes. In Java, as in other countries between the tropics, the year is divided into a wet and a dry season, and these seasons depend on the periodical winds. Hurricanes are very rare, but thunderstorms are frequent and destructive, and earthquakes are common in the vicinity of the volcanoes.

Though not equal to the Hindus in agriculture, the Javanese are far superior to their immediate neighbours of the other islands. They are well acquainted with the cultivation of rice and other grains, and with the advantages of irrigation. Wheat was introduced by the Dutch, and is cultivated on the more elevated lands. Millet is grown in some places on a limited scale. Among the many esculent roots cultivated the principal are the yam, the sweet potato, the Java potato, arrow-root, the common potato, artichokes, cabbages, and pease. The Javanese also cultivate cucumbers, onions, capsicums, cocoa-nuts, ground-nuts, areca palm, betel, tobacco, coffee, sugar, pepper, cardamoms, ginger, cotton, and great varieties of dye-stuffs and fruits. The cinchona plant has been introduced with great success. Java is the granary of the Asiatic Archipelago, and is supposed to be capable of supporting many times its present population, only about one-third of the surface being yet under culture; its temperature, hot in the plains (ranging from 85° to 94° Fahr.), is cooler in the elevated parts, and the highest peaks are often covered with ice. The climate, except in the marshy regions of the north, is healthy, but enervating to Europeans after a stay of any duration. The vegetation is magnificent, and the mountain and forest scenery very grand. Between 2000 and 5000 feet the forests and ravines exhibit the greatest number of beautiful and striking tropical forms. Of these perhaps the most remarkable is the tree-fern, "with its feathery crown," which reaches 50 feet in height. The palm and ginger tribes, begonia and melastomas, with ferns, lycopods, and epiphytous orchids, characterize this zone. At 5000 feet equisetums appear, at 6000 feet raspberries abound, and to 7000 feet there are many edible species of Rubus. At 7000 feet cypresses appear, forest trees dwindle, and mosses and lichens are abundant. At about 8000 feet European forms of vegetation come on, many species at this height and upwards being identical with those common in Great Britain. At 9000 feet altitude, on Pangerango Mountain, south-east of Batavia, the royal cowslip or imperial primrose is met with, which is said to be found nowhere else in the world. It grows to the height of 3 feet, with root-leaves 18 inches long, and has a straight stem with whorls of flowers like a cowslip. The highest summits have gnarled bushes, grassy mosses and lichens, and many flowering plants of European species. Another plant peculiar to Java is the upas or chettik, known to us as the poison tree (*Artocarpus*, *Antiaris toxicaria*), whose juice contains strychnia, but which does not, as the fable asserts, exhale poison.

In mineral wealth the island is not rich; a little gold dust is found in some of the streams; coal of an inferior quality occurs extensively; sulphur, marble, salt, and a peculiar kind of edible clay are worked by the natives.

There are 10 elephants, camels, or asses. The horses are of a small breed, but strong, fleet, and well made. Buffaloes are numerous, and of greater use in agriculture than any other animal. Black cattle and goats are common, but sheep and hogs scarce. There are tigers, tiger cats, leopards, jackals, rhinoceroses, and other wild animals, and also crocodiles and serpents. Domestic fowl and fish are very abundant.

Political Divisions, Towns, &c.—The government is administered by a governor-general (who has authority over all the Dutch East Indian colonies), assisted by a secretary-general and a council of four members, of Dutch descent. Three superior tribunals and courts-martial are seated at Batavia, Samarang, and Surabaya, the whole being subordinate to a supreme court at Batavia. There is complete religious toleration, and Europeans are not prevented from going to Java, though the permission of the governor-general is necessary to their settling there. Java is divided into twenty-two residences, in each of which are a European governor and secretary and various subresidents. These provinces are subdivided into arrondissements and

communes, in each of which there is a justice of the peace. The most considerable and remarkable towns in the country are on or near the northern shores. **BATAVIA** is the capital. All the towns are in the Dutch possessions. There are several native states in the interior under Dutch protection. Increasing interest is being shown by the authorities in the education of both Europeans and natives.

Commerce, &c.—Java is extremely well adapted for an extensive commerce. The island itself is rich in productions, and its northern coasts, which are accessible to vessels all the year round, lie opposite the richest countries of Asia. Besides this, the Dutch government has made it the centre of all the trade which Holland carries on with its extensive settlements in the Indian Archipelago. Hence the transmission of native produce to other countries and the importation of foreign commodities are both very large. The imports comprise cottons, woollens, and other manufactured goods, wines, spirits, iron, hardwares, machinery, opium, and articles of luxury. The commerce is chiefly carried on by the Dutch East India Company, and the Netherlands absorb fully five-sevenths of the whole. Batavia is the centre of at least half of the general trade. The exports of Javan produce, except to Holland, are comparatively trifling, caused by the restrictive duties charged on them when shipped to any other country. The chief articles are sugar, tea, coffee, indigo, rice, hides, tobacco, caoutchouc, and edible birds' nests.

The total value of merchandise and specie imported into Java is nearly £4,000,000 per annum, and that of the exports £5,000,000, almost the entire trade being with the Netherlands. There is, however, a growing trade with the United Kingdom. Public improvements have of late years been much extended. Good roads traverse the island in its entire length, and railway communication is extending. Commercial stations have been planted in the island, and regular steam communication is kept up with Singapore.

The manner in which the colony was formerly held caused it to be an extremely lucrative possession, but the effect of the system on the inhabitants was degrading in the extreme. The leading feature of the Dutch system was the ownership by the state of all the lands in the island. All the island was administered on this footing, with the exception of a couple of quasi-independent states, ruled by native princes under the eyes of a Dutch political agent and the guns of a Dutch garrison. The whole population was not only bound down to the soil, but limited rigorously as to the productions to be raised upon it. The produce was brought into government markets and bought at government prices, and the margin between the sums it fetched in Java and at Amsterdam was always great and often fabulous. The system, however, is now being gradually abolished by an Agrarian Act for the Dutch East Indian possessions. The most important clauses of this Act are that land leases may be granted for periods not exceeding seventy-five years, and in reality invites the immigration and colonization which for so long had been studiously discouraged. Holland, in short, threw open to all the world the rich garden she had previously made a close monopoly of, and renounced the right of the crown to all the lands cultivated by the natives; and when the illimitable resources of the colony are considered, it is more than likely that the new policy will be even more remunerative than the old.

Inhabitants.—The natives of Java belong to the widely-spread race of the Malays. They are short, thickset, and robust. The religion is Mohammedanism, modified by Buddhism. Three different dialects of the Malay language are spoken on the island, but they have also an ancient sacred language, called Kawi, which contains a great number of Sanskrit words. The Javanese have a native literature, which, however, is not rich. They have also translations from the Sanskrit and Arabic. In civilization the Javanese are much superior to all other nations who inhabit the

Indian Archipelago. They show skill in manufactures of cotton, silk, and shipping. The music of the Javanese is very peculiar. In April, 1883, some Dutch gentlemen brought a *gamelan*, or complete orchestra, to London, and opportunity was taken to critically examine it. All the instruments, or practically all, are percussive. There are wooden plates, resting on a light frame, as in the harmonicon, and with spare plates to enable the scale to be changed; metal plates, or rather bars, of copper and silver; and bells shaped like an inverted kettle with a hollow boss on the top, placed on a frame and struck from above on the boss. They have also drums and tomtoms. A sort of flute is the only non-percussive instrument. The scale was so peculiar that its law could not be discovered.

History.—Java was under Hindu sovereigns till 1478, when it was conquered by the Arabs. It contains the ruins of several cities and temples, the principal being Mojopahit, the former capital.

The Portuguese reached Java in 1511, and soon after began to form small settlements. The Dutch established themselves at Bantam in 1575, and in 1602 the English erected a factory at the same place, which was the first possession of the English in the East Indies. But the English, as well as the Portuguese, were soon obliged to give way to the Dutch, who built the town of Batavia, and by degrees enlarged their dominion, until they succeeded, about the middle of the last century, in dividing the empire of the Susuhunan into two parts, and appropriating the greater portion of it to themselves. When Holland was united to the French Empire, the British took possession of the island in 1811, but restored it to the Dutch after the fall of Bonaparte, in 1816.

JAVELIN-SNAKE. See ACOTIAS.

JAXAR TES, or SIR DARIA, a river of Asia, rises in several heads on the north-west base of the Tengri-Khan or highest mountain of the Thian-Shan, 79° 30' E. lon. Traversing the mountain valleys south of Lake Issik-kul and the province of Fergana or Khokand, under the name of the Narin, in a direction west-south-west for 550 miles, it escapes from the narrow valley below Khojend, and enters the open steppe. Its course thence is north-west 600 miles to the Sea of Aral, which it enters by two mouths near Aralsk, 61° E. lon. It is a deep and broad river, and overflows its banks widely early in summer, owing to the melting of the snows. In the steppe the average fall is 7½ inches; but it seems formerly to have had a course further west with a fall of 11½ inches. Above the delta the width is from 300 to 500 yards, and the depth 20 feet. The delta is a large swampy tract, subdivided into many channels, and diminished by irrigation. It is of little use for navigation. The mouths of the river have only a depth of from 6 to 10 feet.

JAY (*Garrulinae*) is a subfamily of Crows (*Corvidae*), distributed throughout most of the northern and temperate regions of the globe, but not represented in South America, Africa, or Australia. The Common Jay (*Garrulus glandarius*) is distributed throughout Europe, except in Southern Russia; it is also found as a winter visitor in Algeria and Morocco. This handsome bird measures nearly 14 inches in length, and is of a general reddish-brown colour, paler beneath; the crown of the head is adorned with a small erectile crest, of which each feather is streaked with black; on each side of the chin is a moustache-like black

streak; the quill feathers of the wings are black, with the outer webs of the primaries dusky-white, and a pure white spot near the base of the secondaries; the primary wing-coverts are barred with black, white, and bright blue, and the tail feathers are black. The jay is well known in England and the southern parts of Scotland, but it is becoming rare in Scotland and in some parts of England, owing to the persecution which it suffers from gamekeepers and gardeners. It inhabits the thick woods, and builds its nest either in a tall bush or among the lower branches of a tree, but always in a situation which affords it a safe concealment. The nest is cup-shaped, and composed externally of small sticks and twigs lined with roots and grasses. The eggs, which are from four to seven in number, are of a greenish-white colour, minutely speckled with light brown. The young birds accompany their parents for several weeks.

The food of the jay consists partly of insects and worms, and partly of vegetable matters, especially acorns and beech mast, its predilection for which is alluded to in its specific name. It is fond of peas and ripe fruits. Its



The Jay (*Garrulus glandarius*).

depredations on eggs and even young birds are very great. The general note of the jay is harsh and grating, but in the breeding-season it becomes almost wholly mute; in captivity there is scarcely any sound that it will not learn to imitate—the cries of fowls, the bleating of a lamb, the mewling of a cat, the barking of a dog, the neighing of a horse, and even the articulate sounds of the human voice.

The true jays (*Garrulus*) are not represented in America, their place being taken by a group of brilliantly coloured birds called blue jays. The Common Blue Jay (*Cyanurus cristatus*) is found in Canada and the Eastern United States. It is more elegant in its form than the preceding species, which it resembles in its general habits and in its liveliness and imitative talents. Its plumage is light purplish-blue above, and white beneath; the head is adorned

with a handsome crest of blue feathers, and the neck with a crescent-shaped black mark; the wings are blue, as are also the feathers of the long wedge-shaped tail, the wingprimaries and tail feathers being marked with transverse black bands and tipped with white. The whole length of the bird is about 11 inches. The blue jay is an inhabitant of the woods and forests, among which its singular and varied notes are constantly heard during the spring season. Its favourite diet consists of chestnuts, acorns, and Indian corn; but it also visits the gardens occasionally in search of fruit, and frequently picks up insects or caterpillars upon the branches of the trees. It also preys upon eggs and young birds. The immortal blue jay of Mark Twain probably belonged to another species of the same genus, as this species is not found in California.

JEDBURGH (colloquially *Jeddart* or *Jethart*), a royal burgh of Scotland and the capital of the county of Roxburgh, is situated about 10 miles south of Kelso, and 373 miles from London by the North British Railway. It stands in a narrow valley, mostly on the left bank of the Jed. It consists of several wide and well-built streets, having somewhat the form of a cross. There are seven bridges over the Jed, and others over one or two small burns or brooks running into it, all in or near the town. The public buildings are—the castle, built on the site of the ancient castle of Jedburgh, once a royal residence, but now converted into a bridewell and jail; the county buildings, the town-hall, the corn exchange, museum, parish church, Free church, Episcopalian, a Roman Catholic chapel, Evangelical Union church, and two United Presbyterian churches, several banks and a grammar-school. The principal manufactures are of woollens, such as blankets, flannels, tartans, shawls, shepherds' plaidings, hosiery, lambs'-wool yarn, and carpets. There are quarries of red and white sandstone in the parish, and several breweries, corn mills, engine works, tanneries, and an iron foundry. On the south side of the town are the ruins of Jedburgh Abbey, founded by King David I. about 1130. Of this magnificent structure the church alone remains. The north transept contains a beautiful traceried window, and there are two Norman doors in the nave. The church is 230 feet long, and has a tower 186 feet high. The west end was, until 1875, used for service, but the erection of a parish church rendered this unnecessary. The restoration of the building has since been completed as far as the ruins would permit by the Marquis of Lothian. A monastery for Gray Friars was founded in this town by the citizens in 1513, but of it all traces have disappeared. Here may still be seen the house in which Queen Mary lodged after visiting the Earl of Bothwell at Hermitage Castle. Mary continued in it several days, owing to a sickness she had contracted in her unfortunate journey. The apartment which she occupied was on the third storey, and is in tolerable preservation. Thomson, the bard of the "Seasons," was educated at Jedburgh. The proverb of "Jeddart justice," the leading principle of which was to hang first and try afterwards, is supposed to have originated in the many instances of lynch law executed here on border marauders. The population of the burgh at the census of 1861 was 3400. The royal burgh was erected by David I., and the last charter is by Mary, 1556. Jedburgh is the seat of the circuit judiciary courts for the counties of Roxburgh, Berwick, and Selkirk. The burgh is governed by a provost, three bailies, a dean of guild, a treasurer, and nine councillors. In the times of the border wars Jedburgh was for some time in the possession of the English, but the castle was taken by the Scotch in 1409, and demolished. Like other borderers, the citizens of Jedburgh were anciently more celebrated for their martial than for their peaceful virtues. Their favourite weapon was a partizan or halbert, known by the name of the "Jeddart (Jedburgh) staff." Their war-cry or slogan was "Jeddart's

here." The town has the distinction of being the birth-place of Sir David Brewster in 1781, and also of Mary Somerville in the preceding year.

JED'DAH or **JID'DA**, a city of Arabia, situated on the east coast of the Red Sea, near Mecca, and a great entrepôt for foreign commerce. The town was rendered notorious in 1858 for the savage butchery of the Christian residents, including the English and French consuls, for which retribution was exacted by the bombardment of the town. Although the resident population does not as a rule exceed 5000 or 6000, the number is usually increased by the influx of strangers on their pilgrimage to Mecca. Its public buildings are but of a mean description. The governor's house, a small castle with nine or ten guns, five mosques, and a few handsome khans, are all that claim attention. The town is one of the holy places of the Mohammedan faith, and its sanctity is increased by the reputed tomb of Eve being in the neighbourhood. The supply of water is chiefly from rain cisterns, but there are springs at some distance from the town. The country around is comparatively a desert, and there are few trees except near some of the mosques. These are numerous in the town, but only two are of stately proportions. There are exports of gums, incense, medicinal plants, essences, coffee, &c.

JED'DO or **YEDDO**, the former name of the capital of Japan, which is now called **TOKIO**.

JEE JEEBHOY, SIR JAM SETJEE, a famous Parsee merchant and philanthropist, was born at Bombay, 15th July, 1783. Although his parents were poor he received a good education, and having shown a special aptitude for mercantile pursuits, he at an early age became partner in business with his father-in-law, Framjee Nusserwanjee. His skill and enterprise were soon manifested in extensive and successful speculations in the produce of various countries, and in the prosecution of business he had made many long and hazardous voyages before he had completed his twenty-fourth year, when he became principal partner in the firm. Ere he had been twenty years in business, and when still young, he had amassed an immense fortune, which, instead of spending in personal display and luxurious gratification, he resolved to devote to the good of his less fortunate fellow-men. He expended vast sums on benevolent institutions and works of utility connected with his native city. Exclusive of private charity, it has been computed he bestowed between the years 1822 and 1852 not less than £250,000 sterling in the foundation, endowment, or support of undertakings of a benevolent character. Munificence so unprecedented did not escape the notice of Her Majesty Queen Victoria, who, as a mark of her esteem, conferred on him the honour of knighthood, the first instance of its being bestowed on an Indian subject. Other honours followed, and in 1857 he was made a baronet of the United Kingdom. In 1843 the queen sent him a gold medal set in diamonds. He died 15th April, 1859.

JEFFERSON, THOMAS, third president of the United States of America, was born 2nd April, 1743, at Shadwell, Albemarle county, in the State of Virginia. He was educated at the College of William and Mary, at Williamsburg, and practised law very successfully for several years, but devoted himself to public life in 1769, when he was elected to the Virginia House of Burgesses. He was a member of the first Virginian convention which met independently of the British authorities, and a pamphlet written by him, entitled "A Summary View of the Rights of British America," was adopted by Burke and republished with a few alterations in London. In 1775 he was elected to the general Congress, and the following year he drew up the famous Declaration of Independence, which, with some alterations, was accepted by the Congress, and signed 4th July, 1776. During the war in defence of this declaration he was governor of Virginia, and in 1784 he succeeded

Franklin as minister to France, where he remained five years. His industry and methodical habits enabled him to devote a great deal of his time to the examination of everything that could prove beneficial to his countrymen, and he secured also several important modifications of the French tariff in their favour. In 1789 he returned home on leave of absence, and the following year was appointed by Washington secretary of state. In his new office he became the head of the democratic section of the cabinet in opposition to Hamilton, John Adams, and Jay, who were in favour of a strong centralized federal government. In 1793 Jefferson resigned, but continued to take an interest in politics. In 1796 he was elected vice-president of the United States, and in 1801 he was chosen to succeed Mr. Adams as president by the House of Representatives, on whom the election devolved, in consequence of the equal division of the electors' votes between Mr. Jefferson and Aaron Burr. On entering the presidency he eschewed all pomp and ceremony, abolished court etiquette, disregarded titles of honour, and in everything showed himself consistent with the republican simplicity he had always advocated. The greatest public act of his administration was the purchase of Louisiana from France for the sum of 15,000,000 dollars, but he was unwearied in his efforts to promote all those measures which he believed to be for the general welfare. He was re-elected in 1805, and after fulfilling his second term retired into private life, taking up his residence at his country house at Monticello. His own opinion of his public career was that his most important services were rendered during the time he was vice-president, when he was able to oppose successfully the efforts of the federal party. A consistent democrat, he believed that "the world is governed too much," and therefore sought to limit the power of the central government, and to encourage the assertion of independent state rights and powers. The closing years of his life were spent in dignified retirement; he maintained an extensive correspondence with all parts of the world, practised a liberal hospitality, and took an active part in the foundation of the University of Virginia. Though repeatedly baffled, he finally succeeded, by the help of his friends in the Virginia Legislature, in obtaining ample grants for the buildings, library, and the salaries of the professors. He died 4th July, 1826, just half a century after that day on which the Declaration of Independence was signed, and by a curious coincidence his predecessor in the presidency, John Adams, who had also signed the Declaration, died the same day. It was with Jefferson's election to the presidency that the long rule of the democratic party was commenced, and it was to his leadership that the triumph was chiefly due.

JEFFREY, FRANCIS, LORD, an eminent Scotch judge and critic, was born at Edinburgh. 23rd October, 1773, and was the son of Mr. George Jeffrey, one of the deputy-clerks of the Court of Session. He was educated at the High School of Edinburgh, from which he passed in 1787 to Glasgow College, where, under the able training of Professors Young and Jardine, his talents began to develop themselves with great brilliancy. In September, 1791, Jeffrey went to prosecute his studies at Oxford, which he quitted with great delight after a residence of only nine months, shocked at the dissipation and idleness which then prevailed in that seat of learning. In 1792, on his return to Edinburgh, he entered the Speculative Society, a step which brought him into close and familiar contact with Sir Walter Scott, Brougham, Horner, and other master spirits of the age. He was called to the bar on the 16th of December, 1794. At this time he joined with Sydney Smith, Horner, and others in establishing the *Edinburgh Review*, of which he continued sole editor for twenty-seven years, and by his labours undoubtedly established in England a new school of criticism. He was peculiarly

fitted for the management of such a periodical, not only by his extensive and varied information, calm judgment, and singular versatility of intellect, but also by a natural suavity of temper, which kept his mind serene amid all the harassing annoyances to which an editor is exposed. His own contributions numbered 200, six only of which were written after his resignation. A selection from these was published, in 1843, in four volumes, but their fame has not been of a lasting character. His legal success at the outset was but small, and when in 1801 he married Miss Catherine Wilson, daughter of Dr. Wilson, professor of church history at St. Andrews, his professional income did not exceed £100 a year. In 1804 he had the misfortune to lose his father and brother, together with his amiable partner—a blow which sunk deep into his heart, and made him, he says, "inwardly sick of life." Up to this period, though he had been nine years in practice, his professional income was only £240 a year. Now, however, his prospects began to brighten, and he gradually won his way to the foremost rank in all the courts, civil, criminal, and even ecclesiastical. About the close of the year 1813 Jeffrey married a second time. The object of his choice was an American lady, Miss Charlotte Wilkes, grandniece of the celebrated John Wilkes. Lord Cockburn says that almost the whole happiness of Jeffrey's future life flowed from his union with Miss Wilkes, and speaks in strong terms of the natural and cheerful pleasure which she diffused round her husband and his friends. In 1820, after a keen contest, Jeffrey was chosen lord rector of the University of Glasgow, an honour of which he was justly proud; and in 1829 his brethren of the bar elected him their dean, the highest distinction of the kind that can be conferred in Scotland. In 1830 he was appointed lord advocate for Scotland, and was returned to Parliament for the Forfarshire burghs in 1830, for Walton in 1831, and for Edinburgh in 1832. As a speaker he can scarcely be said to have succeeded in the House of Commons. The most important measures connected with it were the Scotch reform bill, and the bill for the reform of the burghs of Scotland, both of which he prepared and carried through. The death of Lord Craigie caused a vacancy in the Court of Session, and Jeffrey was elevated to the bench in 1834. The remainder of his life was passed in the quiet discharge of the duties of his judicial office. He died on the 26th of January, 1850, in his seventy-seventh year. Mrs. Jeffrey survived him only a few months.

Further details of this distinguished man's career will be found in Lord Cockburn's interesting Memoir, the perusal of which will impress the reader with a high opinion of the excellence of Jeffrey's character and the charms of his society. See also Carlyle's "Reminiscences," vol. ii., 1881.

JEFFREYS, JUDGE. This execrable person, George Jeffreys, afterwards Baron Wem, was born at Acton in Denbighshire in 1648, entered Middle Temple in 1663, and was called to the bar in 1669. He was recorder of London, was knighted in 1678, became chief-justice of the county palatine of Chester in 1680, and was promoted to be chief-justice of the King's Bench in 1683. His subservience to the royal will was well shown in his passing sentence on Algernon Sidney, 1683; and still more, on the accession of James II., when he made short work of the cases of Titus Oates and Baxter, and his reward was the peerage of Wem. James, happy in such a tool, sent him to try the rebels in the unhappy rising under the Duke of Monmouth, his brother and predecessor's illegitimate son; and he held out the seals as a further bribe to insure severity. Jeffreys well earned his reward in the terrible travesty of justice called the "Bloody Assize," or the "Bloody Circuit;" 350 rebels were hanged, over 800 were sold into slavery and sent to the West Indies and the American colonies, and the number of those whipped and

imprisoned exceeds computation; while not only the judge, but the queen, the maids of honour, and other personages of the court made large sums of money by the sale of pardons. Women were publicly whipped at the cart tail. Mrs. Lisle was beheaded at Winchester for harbouring a wounded rebel, although she was an aged lady universally beloved for her ready benevolence. Her late husband had been a lord of Cromwell's creation, and though the nobility of the Protectorate was not recognized at the Restoration, she was generally known as "the lady Alice." Indignation rose; but it increased into a deep hatred when men saw the fires lit to burn Elizabeth Gaunt at the stake in Tyburn, for a like offence with good Mrs. Lisle. The "Bloody Assize" raged over August and September, 1685, and at its close Jeffreys was made lord chancellor. In 1686 he was named head of the seven commissioners to govern the church, and at once began the persecution of the bishops, which in 1688 culminated in the prosecution of seven of them for libel, quickly followed by James' overthrow. Jeffreys endeavoured to escape in disguise, but was recognized by his bloated red face at Wapping, and dragged off by the populace. He was rescued by the trainbands, and taken to the Tower, 13th December, 1688, the mob pursuing the carriage with howls of rage and fury; there he died on the 18th April following, 1689. He never recovered the terror of that dreadful night and its long procession, with the never-ceasing chance of a violent death. His fate had long been the subject of debate, and no death was thought bad enough for him; but meanwhile he drank heavily, and through that low means sank under the universal opprobrium to a miserable end.

JEHOVAH, one of the names of God used in our Authorized Version. In the original it is a word of four letters only, YHWH, all the vowels being, as usual in ancient Hebrew, omitted. The true pronunciation has long been lost, as the Jews, from motives of reverence and the fear of transgressing the third commandment, were accustomed to substitute the name *Adonai* (Lord) or *Elohim* (God) in the reading of the Scriptures. In fact as time went on it was absolutely forbidden to pronounce YHWH. When therefore in late Jewish times vowels were added to Hebrew, lest the pronunciation of the language should be lost, the vowels either of *Adonai* or of *Elohim* were added to YHWH, and its own vowels, from long disuse, were at last forgotten. It therefore became *Yehowah* or *Yehowih*, and more frequently the former. Our own Authorized Version is the only translation of repute which has used this artificial word, and even it very rarely commits the blunder. Whence, then, do we get the pronunciation *Yahweh*? From certain Phœnician and Greek inscriptions recorded at a time when the Jews still remembered the pronunciation of the sacred name, which has thus been preserved to us by strangers. The syllable *Yah* should rhyme with *fa* in "far," and the syllable *weh* with *we* in "wet;" the *h* at the end is to be sounded. By modern scholars the word is variously rendered, as *Yahweh*, *Yahve*, *Yahveh*, *Yahväh*, &c., and these forms are now occasionally used in theological writings instead of the more current *Jehovah*. In the earlier times it is evident that *Jehovah* was regarded as being specifically the God of Israel, the leader of their armies, their defence and their lawgiver. While the name *Elohim* is also used in speaking of the gods of other nations, the name *Jehovah* is expressly reserved for the God of Israel, and in many places we find he is compared with the gods of other nations, and praised as being more powerful than they. In the earliest writings the representation of *Jehovah* is anthropomorphic to an extreme degree; but as the religious conceptions of the people became enlarged through the teaching of the prophets, more lofty and spiritual attributes were ascribed to him, and though he was still regarded as in some sense peculiarly the God of Israel, it was also seen that *Jehovah* was the God of the whole earth.

The use of the two names *Elohim* and *Jehovah* in the books of the Pentateuch has given rise to an elaborate controversy as to the date and authorship of this portion of the Old Testament. See **PENTATEUCH**.

JEJU'NUM. See **INTESTINES**.

JELALABAD'. See **JALALABAD**.

JELLY-FISH. See **MEDUSA**.

JENA, a town of Germany, in the grand-duchy of Saxe-Weimar, is situated on the Saale, over which there is a stone bridge of nine arches, about 56 miles south-west of Leipzig by rail. The ramparts and moats which formerly surrounded the town have nearly disappeared. Jena is the seat of a supreme court of appeal and of several learned societies. It is, however, chiefly celebrated for its university, which was founded in 1557, and has a library of nearly 200,000 volumes. There are in connection with it a botanic garden, a veterinary school, a school of midwifery, an anatomical theatre, a clinical institution, a collection of physical and mathematical instruments, a cabinet of minerals, an observatory, &c. It is the university of the whole of the Saxon states, and is supported by contributions from them all. Its income is nearly £6000 per annum, and an academic honour obtained at it is much prized throughout all Germany. The population of the town in 1882 was 9000. Jena has acquired celebrity from the disastrous defeat of the Prussians by the French which took place near it on the 14th of October, 1806. The result of this battle and that of Auerstadt (which was fought on the same day) was the triumphant entry of Napoleon into Berlin.

JENKES'S CASE is famous in our constitutional history as having led to the **HABEAS CORPUS ACT** of 1679, by the hardships inflicted upon the prisoner. Jenkes had been committed to prison by the king in council in 1676, and it was with the greatest possible trouble that he obtained a writ of Habeas Corpus. The lord chancellor denied it through the long vacation, and this was justly made a special grievance by Jenkes. It now forms no just reason for denying a Habeas Corpus that it is sued for in vacation time.

JENNER, EDWARD, the discoverer of **VACCINATION**, was born at Berkeley in Gloucestershire, on the 17th of May, 1749. He was the third son of the Rev. Stephen Jenner, vicar of Berkeley. At eight years of age Jenner was sent to school at Wootton-under-Edge, under the Rev. Mr. Clissold, and was afterwards placed at Cirencester, under the tuition of the Rev. Dr. Washbourne, where he received a respectable classical education. On leaving school he became the pupil of Mr. Ludlow, an eminent surgeon at Sodbury, near Bristol. His apprenticeship having terminated, he proceeded to London, where he prosecuted his professional studies under the immediate superintendence of John Hunter, in whose family he resided for two years. There can be no doubt that the intimacy which sprang up between the master and pupil, and which continued until Hunter's death, exercised a powerful influence on Jenner's subsequent career. The love of natural science, which with him was almost an instinct, was fostered and quickened into the highest degree of life and energy by the example and teachings of Hunter, who had already commenced the formation of that magnificent museum which forms the lasting monument to his fame. It was in such a field that Jenner's powers were cultivated. He became an expert practical anatomist, a careful and observant experimenter, a sound pathologist, and a finished naturalist. During the time of Jenner's residence with Hunter, in the year 1771, Captain Cook returned from his first voyage, and Jenner was recommended by Hunter for the service of arranging and preparing the specimens of natural history which had been collected by Sir Joseph Banks. The manner in which the task was accomplished showed so much skill and knowledge, that Jenner was offered the

post of naturalist to the next expedition, which sailed in 1772. He declined, however, the appointment, and decided to return to Gloucestershire and fix his residence in the place of his birth, where he took up his abode with his brother, and commenced the practice of his profession. The reputation he had brought with him from London, the great professional knowledge he evinced, and his kindly disposition and manners, rapidly brought him practice. In March, 1788, he married. In the year 1792 Jenner retired from the more onerous duties of a country practitioner's life, and obtained the degree of M.D. from the University of St. Andrews. It was not long after this that he made the great discovery which has enwreathed the memory of Jenner with honours that time can never wither. The first incident in the story dates back to the time when Jenner, as the surgeon's apprentice, was pursuing his professional education at Sodbury. One day a young country-woman applied at the surgery of his master for advice. The small-pox was casually mentioned in her hearing; she immediately observed, "I cannot take that disease, for I have had cow-pox." This assertion made a deep impression on Jenner's mind; it was the first time he had heard of what had been for many years a tradition among the peasantry in the dairy districts of Gloucestershire and other counties; he continued to think of it, and when, some time after, he was domiciled in London with Hunter, he mentioned the subject of cow-pox to him. It does not, however, appear that Hunter was impressed with the importance of the consequences which were involved in the popular observation. He mentioned the Gloucestershire tradition in his lectures, on Jenner's authority. He likewise spoke of it to some professional friends, and it was noticed in other lectures of the time; but he never pursued the matter further. Jenner, however, never lost sight of it; he found the subject loaded with many obscurities and contradictions which he set himself to unravel, and he never failed to stimulate all his professional friends and acquaintances to apply themselves to its investigation. In this latter object he met with but little success. Determination of purpose was, however, a leading characteristic in Jenner, and regardless of the arguments and ridicule of his friends, he continued to prosecute his inquiries. He discovered that cows were the subjects of at least two eruptive diseases which were capable of producing sores on the hands of those employed in milking, and that to both these affections the name of cow-pox was applied. It was only one of these diseases, however, which gave immunity from small-pox. He ascertained also another most important fact, that in the case of the true cow-pox it was only in a certain state of the pustule that virus was yielded capable of affording a protective power. He found that matter taken at a later period might induce a local sore, but that it failed in bestowing any safety from variolous contagion. It was in the year 1780 that he first disclosed the result of his inquiries to his friend Edward Gardner. In the year 1788 he took a drawing of the casual disease, as it occurs on the hands of milkers, to London, and showed it to Sir Everard Home and others. The subject attracted some attention; and Dr. Adams, who had heard of it from Mr. Cline, mentioned it in his work on "Morbid Poisons," which appeared in 1795. It was not until a year later, 1796, that Jenner was able to institute the first experiment, which proved that the disease might be communicated by artificial inoculation. The following is Jenner's own report of the experiment, extracted from one of his letters to Edward Gardner:—"As I promised to let you know how I proceeded in my inquiry into the nature of that singular disease, the cow-pox, and being fully satisfied how much you feel interested in its success, you will be gratified in hearing that I have at length accomplished what I have been so long waiting for, the passing of the vaccine virus from one human being to another by the

ordinary mode of inoculation. A boy of the name of Phipps was inoculated in the arm from a pustule on the hand of a young woman (Sarah Nelmes) who was infected by her master's cows. Having never seen the disease but in its casual way before, that is, when communicated from the cow to the hand of the milker, I was astonished at the close resemblance of the pustules, in some of their stages, to the variolous pustules. But now listen to the most delightful part of my story. The boy has since been inoculated for the small-pox, which, as I ventured to predict, produced no effect. I shall now pursue my experiments with redoubled ardour." The experiment above referred to was performed on the 14th May, 1796, a day which for many years was celebrated as a public feast in Germany. After multiplying his experiments, Jenner published his first memoir in June, 1798. The progress of vaccination was darkened at the outset by various disappointments and obstacles. Objectors were numerous, and rival claims to the merit of the discovery were set up. But a high tribute to Jenner was paid as early as the year 1799, when a large number of leading physicians and surgeons signed an earnest expression of their confidence in the efficacy of the cow-pox. The discovery was soon afterwards promulgated throughout civilized Europe and America, and it was introduced into Asia by Dr. De Carro, at that time a physician of Vienna. Honours were showered on Jenner by foreign princes, and by the principal learned societies of Europe; the royal family of England exerted themselves to promote the cause of vaccination; and Parliament voted to its discoverer, in the year 1802, a grant of £10,000, and in the year 1807 an additional grant of £20,000. The latter days of Jenner were occupied in the dissemination and elucidation of his great discovery. He died of apoplexy at Berkeley in February, 1823. A statue to his memory has been erected by the French at Boulogne, and in 1858 one was erected in London. (See the "Life and Correspondence of Jenner," by Dr. Baron, two volumes, 1827, 1838.)

JEN'YNS, SOAME, was born in 1704, and died in 1787. He was educated at St. John's College, Cambridge; he was M.P. for Cambridgeshire in 1741; for the borough of Dunwich in 1754; and for the town of Cambridge from 1761 to 1780. In 1755 he was made a lord of trade, and he held that office in spite of political changes until its abolition in 1780. His poems, which consist of "The Art of Dancing" (1728), and "Miscellanies" (1770), are included in Johnson's "Works of the English Poets." His prose works are—"A Free Inquiry into the Nature and Origin of Evil" (1756), held of sufficient importance by Dr. Johnson to call down a ponderous and conclusive reply from him; "View of the Internal Evidence of the Christian Religion" (1776); and "Dissertations on various Subjects" (1782). His works are collected in four volumes 8vo (1790-93).

JER'BOA (Dipodidæ) is a family of mammals belonging to the order ROENTIA, characterized by the great length of the hind limbs in proportion to the fore pair, and by the length of the tail. This peculiar formation enables the jerboas to make long leaps, after the fashion of the kangaroos. The incisor teeth are compressed; the molar teeth have transverse enamel folds, and in some cases are rootless. The Egyptian Jerboa (*Dipus ægyptius*) may be taken as a type of this family. This pretty little animal is a native of Arabia and South-western Asia as well as of the country from which it takes its name. The body is about 8 inches in length, exclusive of the tail, which measures 10 inches; this latter appendage is very long, well covered with hair, and terminates in a tuft. It has a short head; thin, broad, upright ears; large, round, dark eyes; the fore legs are little more than an inch or two long, with five toes to each foot, each toe furnished with sharp crooked claws; the hind legs are extremely thin, and covered with short hair, the feet having three toes each,

of which the middle is the largest. The teeth are sharp and strong, like those of a rat; and on each side of the nose project several long hairs or whiskers. The upper surface of the body is of a tawny colour, the under surface being white. The annexed cut represents the Jerboa when about to take a leap, which it does with such rapidity as to present the appearance of a bird flying close to the surface. The Jerboa inhabits dry, hard, and clayey soils, in which it excavates burrows of considerable length and having an oblique sinuous course. About 20 inches below the surface of the ground they terminate in large cavities or nests, usually provided with but one opening; but the wary animal is careful to form another passage to within a short distance from the surface, and in case of need it rapidly makes its way through the thin upper soil. It sleeps during the day rolled up, with its head between its thighs, but comes out at sunset in search of food. It lives upon grains of corn, leaves, herbs, and other vegetable substances. The jerboa is not easily captured, owing to its shyness coupled with its singular agility. Of the genus *Dipus* twenty species have been described distributed widely over the Old World, with the exception of South Africa. Some species are separated from this genus owing to their having

five toes on the hind feet, though the two outer are functionally useless. One of the best known of these is the *Alactaga* (*Alactaga jaculus*), which extends from Southern Russia throughout Central Asia. It is larger than the common jerboa.

The jerboas are represented in America by the Labrador Jumping Mouse (*Zapus hudsonius*), which differs from the true jerboas sufficiently to make it the type of a subfamily, *Zapodinae*. The hind feet have five fully developed toes; the metatarsal bones are separate. The jumping mouse extends over nearly the whole area of North America, and is very abundant in the fur countries. The body is about $4\frac{1}{2}$ inches in length, with a tail about 2 inches longer. It is a nocturnal animal, and is always found near woods and copses. It passes the winter in a state of torpidity. The fur is brown above, becoming yellowish at the sides and white underneath.

South Africa contains a peculiar form of jerboa, which also constitutes a distinct subfamily, *Pedetinae*. This animal, the Cape Jumping Hare (*Pedetes caffer*), is the largest member of the family, measuring 14 inches from the nose to the root of its bushy tail, and about 16 or 18 inches from that to the extremity of this appendage. The hind



The Egyptian Jerboa (*Dipus aegyptius*).

feet have four toes, which are armed with very long sharply-pointed claws. The ears are largely developed. The molar teeth have no roots; their crowns also are divided into two equal oval-shaped portions, by a fold from the outer side in the upper series, and from the inner side below. The fur is of a bright yellow-brown colour generally. The Cape jumping hare is a very powerful animal, leaping as much as 30 feet at a single bound. During sleep it assumes a sitting posture. In its habits it resembles the other members of the family.

JEREMIAH (Heb. *Jirmiyahu*, "Jehovah casts"), one of the prophets of Judah, was the son of Hilkiah, a priest, whose residence was at Anathoth, a city of Benjamin, about 3 miles north of Jerusalem. The year of his birth is unknown, but he was called while young to the prophetic office in the thirteenth year of King Josiah (629 or 627 B.C.), and he prophesied during the reigns of Josiah, Jehoahaz, Jehoiakim, Jehoiachin, Zedekiah, and for some years afterwards, his ministry extending through a period of about forty years. His lot was cast in one of the darkest periods of Jewish history, and he was a witness of some of the sorest trials that ever came upon his nation. In the early part of his life he attached himself to the political party which desired an alliance with the Chaldeans, but Josiah, who favoured this party, lost his life at Megiddo, in the valley of Esdraelon, in a vain attempt to stop the progress of the Egyptian Pharaoh-Necho. Under

Jehoiakim the advocates of an alliance with Egypt were in the ascendant, and the prophet became the object of much hostility on the part of its adherents. Compelled to point out to the people the dangers that impended over them, he was regarded as unpatriotic and disloyal; in his own words, "everyone cursed him." The priests and prophets united in demanding his death, but befriended by some of the princes he escaped their hands, and with unflinching determination persisted in his mission. At last the danger threatened so long came near, and Jehoiakim and his successor were carried into exile, and Zedekiah, a king appointed by Nebuchadnezzar, ascended the throne. The position of the prophet, however, was not much improved, for Zedekiah soon rebelled, and Jeremiah was again exposed to persecution, and at one time was by order of the princes thrown into the prison pit to die of hunger. From this fate he was rescued by the kindness of an Egyptian eunuch, but he was kept in custody until the final capture and destruction of Jerusalem by the Chaldean captain Nebuzar-adan. Jeremiah, who was known as an adherent of the Babylonian party, was patronized by the conqueror, and offered the choice of either going to Babylon or remaining in his own country. He chose the latter, and resided for a time with Gedaliah, the native governor at Mizpah. After the murder of Gedaliah, Jeremiah was taken against his will to Egypt by a party of his countrymen, and we read of him as prophesying at the city of

Tahpanhes, then authentic history breaks off, and we are left to tradition for the account of his fate. One story, coming through Christian channels, declares that he was ultimately stoned to death by his countrymen at Tahpanhes; while another, preserved by the Jews, is to the effect that on the conquest of Egypt by Nebuchadnezzar, Jeremiah with Baruch escaped either to Babylon or Judea, where the prophet died in peace.

The book entitled his Prophecies is a collection of such oracles or exhortations as he delivered at various times, mingled with relations of historical events. A remarkable circumstance relating to the composition of this book is that the various prophecies are put together without any chronological order or arrangement. Why they are not so arranged it is not easy to say, and the reduction of the different sections to such order has been attempted with divergent results by several modern scholars. It has also been suggested that the prophecies have been arranged according to subjects, and that they may be roughly divided into (1) warnings and reproofs addressed to the people of Judah; (2) a survey of other nations, with a historical appendix; (3) prophecies of a brighter future, with a similar appendix in three sections; and (4) prophecies relating to Egypt. The style of the prophet is marked throughout by a tone of sorrow, struggle, and regret. A man of a shrinking and sensitive temperament, he had to prophesy evil to his countrymen, and though assailed on all sides to persist in delivering the message of Jehovah. Under these circumstances we can hardly wonder that at times his patience gives way, and he utters maledictions truly Oriental in their bitterness (Jer. xviii. 21-23, &c.) The last chapter of the book is evidently the work of a later hand, and it appears to have been derived from the concluding portions of 2 Kings. Possibly it was added by Ezra. There are also some other portions of the book, the authenticity of which has been called in question by recent critics, but up to the present there has been but little general agreement concerning them. There exists considerable discrepancy between the Septuagint version and the Masoretic text of this book. The two versions agree as far as xxi. 13, but after that they diverge very seriously. Not only does the arrangement of the Septuagint differ from that of the received Hebrew text, but it is of less extent by about 2700 words, and many passages are altered both in word and meaning. Modern scholars are divided in opinion as to which version approaches most nearly to the original text, and eminent names might be quoted in support of either view. Several of the Psalms are believed to be the work of the prophet Jeremiah, and Hitzig attributes to him no less than thirty-four. See also LAMENTATIONS.

JER'ICHO, the first city west of the Jordan occupied by the Israelites, and owing to its strategic position with regard to Jerusalem several times totally destroyed and rebuilt, until with the gradual decay that overtook the region in the middle ages, it sank finally into ruins, leaving nothing but a few mounds and the squalid village of Ericha to mark its site. The village is situated about six hours journey north-east of Jerusalem. In Jewish times Jericho was famous for the fertility of its surroundings, and we find the groves of Jericho given by Antony to Cleopatra as a valuable present. As late as the thirteenth century it was a place with some trade in fruit and sugar.

JER'ICHO, ROSE OF, is the popular name of a plant called by botanists *Anastatica Hieracantha*. It is a native of Palestine and other parts of the East, and of North Africa. It is an inconspicuous annual, with small white flowers, belonging to the order *CRUCIFERÆ*. It is an object of interest from its hygroscopic properties. When the seeds are ripe the bare branches curl up into a ball, the rootlets which have fixed it in the ground decay, and it is blown hither and thither over the dry ground. When

at length it reaches a wet spot the branches open, the pods split up, and the seeds fall out on the favorable ground. Many of these plants are brought to this country as curiosities, and for many years will continue to expand when placed in a bowl of water, and curl up again when dry.

JEROME BONAPARTE, King of Westphalia. See BONAPARTE. For Mrs. Jerome Bonaparte, his first wife, and her son "Bo," see PATTERSON.

JEROME OF PRAGUE, the friend and fellow-martyr of John Huss, was born at Prague between the years 1365 and 1370. He studied in the universities of Prague, Heidelberg, Cologne, Paris, and Oxford, and obtained the degrees of master of arts and bachelor of divinity. His reputation for learning was so great that Wladislaus II., king of Poland, commissioned him to organize the new university of Cracow in 1410, and Sigismund, king of Hungary, invited him to preach before him at Buda. He held the doctrines of Wyclif, attached himself to the cause of Huss, and denounced the abuses of the church. In one of his public discourses he trampled the relics under his feet, and excited the minds of the people so violently against the monks that several of them were seized and kept in durance, and one of them was even thrown into the Moldau. When the bull of Pope John XXIII. arrived in Prague, Jerome sent it through the city attached to the dress of a courtesan, and then caused it to be publicly burned along with some indulgences at the common pillory. When he heard of the treacherous imprisonment of Huss at Constance he hastened to join him, but his devoted fellow-confessor had become a martyr before he arrived. The same tragical glory awaited himself. On his return to Prague he was seized by the orders of the Duke of Bavaria, and was carried back in chains. He was then cast into a dungeon and placed on trial. At first his firmness forsook him, and on the 23rd September, 1415, he recanted his opinions, but subsequently abjured his recantation with horror, and he was condemned to death by the Council of Constance, on the 30th May, 1416. He heard his doom pronounced with the utmost composure, and died in the fire with a heroism worthy of the friend and fellow-worker of Huss, bearing witness to the truth with his latest breath. See Heller, "*Hieronymus von Prag*" (Tübingen, 1835); Becker (Nordlingen, 1858); and Lechler's "*Johann Wyclif*" (1873).

JEROME, ST. (Hieronymus), the most learned of the Latin fathers of the church, was born about 340, and died in 420. He was a native of Pannonia, but came early to Rome, where he studied under the grammarian Donatus. He visited Gaul, where he remained some time, and afterwards travelled in Thrace, Pontus, Bithynia, Galatia, and Cappadocia. He also visited Jerusalem, and in 382 he returned to Rome, having spent some time at Constantinople on his way. At Rome he became secretary to Pope Damasus. He was on the point of being elected Pope on the death of Damasus, as we know from one of his own letters ("Epist. ad Asellum"). We do not know the reason of his being passed over. He eventually returned to the neighbourhood of Jerusalem, and took up his abode in a monastery at Bethlehem, where it is believed he died.

Many of the writings of Jerome have come down to us. Among the most valuable are his treatise on the "*Lives and Writings of the Elder Christian Fathers*," and his commentaries on the Prophetic Books of the Old Testament, on the Gospel of St. Matthew, and on several of St. Paul's Epistles. But his greatest work is a translation of the books of both the Old and New Testaments into Latin, which translation has always been highly valued in the Latin Church, and is that known by the name of the *VULGATE*. This he undertook on finding the imperfections still inherent in his careful revision of the *ITALIC VERSION*. The best edition of the works of St. Jerome is that of

Vallarsi (eleven vols., Verona, 1734-42), which contains also nearly all that is known concerning his life and labours.

JERROLD, DOUGLAS, a distinguished dramatist and journalist, was born in London 3rd January, 1803. His father was the manager of a theatre at Sheerness; but it does not appear that the stage, at that early period of his life, had any attractions for his son, who entered the navy as a midshipman under Captain Austen, brother of the well-known novelist, Miss Austen. At the conclusion of the war, however, he had to select another profession, and was placed as an apprentice with a London printer. Here he devoted himself to the study of languages and to literary pursuits. His first impulse for dramatic writing was the favourable reception of a critique on the opera of "Der Freischütz," which he had written for the newspaper on which he was employed as a compositor. Before he was twenty he wrote several dramatic pieces; among others, "More Frightened than Hurt," which was performed at Sadler's Wells, and still keeps the stage. He was then engaged by the manager of the Coburg Theatre to produce pieces at a salary; but he soon afterwards went to the Surrey, where he produced the celebrated naval melodrama of "Black-eyed Susan," which had a wonderful run, and completely retrieved the fallen fortunes of that house. It was afterwards performed for many hundred nights on the boards of the theatres royal, and had the run of nearly all the provincial theatres; but the author's share of the immense profits thence arising did not exceed £70. Jerrold now devoted his pen almost exclusively to dramatic compositions, and produced a long series of pieces, which were played with considerable success at the Haymarket and the Princess's. His talents, however, were not confined to the drama; he applied them in a variety of ways to numerous compositions of a light and agreeable character, which were chiefly contributed to the magazines and newspapers. In *Blackwood* appeared his "Men of Character," and "The Chronicles of Clovenook" in the *Illuminated Magazine*, of which he was editor. His ready wit appeared also in the various numbers of *Punch*, to which he contributed the "Story of a Feather," "Punch's Complete Letter Writer," "Punch's Letters to his Son," and the "Candle Lectures." He was afterwards engaged, at the earnest desire of the proprietor of *Lloyd's Newspaper*, to undertake the editorship of that journal at £1000 per annum; and it is stated that on the assumption of Jerrold's name it received during the first week an accession of 25,000 subscribers. He died in 1857, and was interred in the Norwood Cemetery. His works, which have been collected in eight volumes, exhibit great insight into character, much shrewdness of judgment, and a caustic wit. The style is sharp and epigrammatic, but philosophical views or luminous expositions of moral truth must not be looked for in any of Jerrold's writings.

JERSEY, an island in the English Channel, about 16 miles west of Normandy and 125 south of Southampton, between 49° 9' and 49° 16' N. lat. and 2° and 2° 15' W. lon. Its greatest length east to west is about 12 miles; its greatest breadth north to south is about 6 miles. The area, according to the ordnance survey, is 41·87 square miles, or 28,717 acres, of which about 19,000 are cultivated. The population in 1881 was 52,372.

The surface of the island has a gradual slope from north to south. On the north side the coast is abrupt, rising to the height of 100 to 200 feet, and broken by a succession of small bays and coves. On the remaining sides it is less precipitous. There are several good bays, the chief being the bays of Boulay, St. Catherine, Grouville, St. Ouen, St. Aubin, and St. Brelade. Groups of rocks surround the island at various distances from it, and there are also many banks and shoals. The navigation is very dangerous.

The surface is everywhere undulating. The valleys generally run from north to south; they are narrow at the

north end, where the high ground forms an almost unbroken hill, and grow wider as they approach the southern coast, where they expand into several flats of good pasture land. The principal water-courses therefore flow from north to south.

The high land consists for the most part of granitic rocks; the southern part of a mass of schistose rocks incumbent upon granite. The granite from the Mount Mado quarries, in the northern part of Jersey, is largely exported, and much esteemed in London for paving purposes. The roads are numerous, wide, and well constructed, and traverse the island in many directions.

The climate of Jersey, from its insular situation, is milder than that of other places under the same latitude, and the mean annual temperature (53°) is higher than that of any part of England. The land is very much subdivided, and owing to this and the consequent want of capital, agriculture is far from being in such an advanced state as in many parts of England. Wheat is the principal grain crop. Potatoes for exportation are widely and increasingly cultivated. Lucern is one of the most valued crops, but the chief products are apples and pears—the whole island having the appearance of a continuous orchard. The apples are both exported in large quantities and also made into cider, which forms the chief beverage of the islanders. The celebrated Charmontel pears are grown in great perfection, and fetch very high prices in London. All the cows are of the Jersey variety of the Alderney breed, and are very carefully reared; but sheep and horses are comparatively neglected. Off the south-east coast are oyster-beds, fished by the islanders. Vraie (wrack, or seaweed) is used both for manure and fuel.

Jersey is divided into twelve parishes, in the diocese of Winchester. These are subdivided into vintages (scores), supposed to be so called from having originally contained twenty houses. The livings are in the gift of the crown, and are of small value. The principal educational establishment is Victoria College, where instruction in the highest branches of knowledge is imparted on moderate terms. There are also exhibitions at the Universities of Oxford and Cambridge.

The island has its own legislature—the States or Parliament, consisting of a bailiff of the royal court appointed by the crown, who sits as president, twelve jurats or judges of the royal court, elected for life by the ratepayers, the rectors of the twelve parishes, twelve constables, and fourteen deputies elected for three years. The attorney-general and solicitor-general have seats, but no vote; the governor has a deliberative voice, but does not vote. The only tribunal is the royal court, consisting of the bailiff and twelve jurats. From the decisions of its royal court, the only appeal is to the sovereign in council. As in other isles, the laws are very peculiar, being mainly derived from the ancient customary law of Normandy.

Steamers communicate frequently with Weymouth, Southampton, St. Malo, and Granville, and there is also telegraphic communication with England.

The military governor has under him usually about 300 regular troops, besides which Jersey has a militia of 2500 men, with an artillery battalion. The island is protected by numerous forts, the chief being that of Fort Regent, at St. Helier.

The native inhabitants speak a French *patois*, and preserve many Norman feudal customs, the Channel Islands having formed part of the Norman dominions, and remained attached to England since the Conquest. French is used in all legal proceedings, and also in the debates of the States, but nearly the whole of the population can now speak both English and French, as the former has long been taught in all the principal schools.

The trade of Jersey, owing to the privileges possessed by the islanders (there being no customs duties), is very

considerable. The agricultural produce of the island, potatoes, apples, pears, fruit, cider, butter, cows, and other live stock, are sent to England in return for cotton and woollen goods, hardware, cutlery, glass, about 20,000 tons of coal annually, and general merchandise. The foreign imports are wine, brandy, timber, &c.; the two former being supplied from France, from which Jersey is only 16 miles distant. The chief town is St. Helier.

Jersey, the *Cæsarea* of the Romans, and the largest and most important of the islands belonging to England which represent the Norman inheritance, is said to have been originally called *Augia*. In the reign of Edward III. this island was attacked by Du Guesclin, constable of France, but the arrival of succours from England prevented him from succeeding. In December, 1780, the Baron de Rullecourt landed with 700 men, took possession of St. Helier, and made the lieutenant-governor, Major Corbet, prisoner, and induced him to sign a capitulation. The British troops and island militia, under Major Pierson, next in command, refused to recognize the capitulation, and, attacking the French, killed Rullecourt, with the greater part of his men, and obliged the rest to surrender. Major Pierson fell in the beginning of the attack.

JERSEY CITY, the chief town of Hudson county in the state of New Jersey, is situated on the right bank of the Hudson River, about a mile west of New York, with which it is connected by numerous steam ferries. It is less regular in its plan than most American cities, as it represents several municipalities now united into one. It is provided with the usual institutions and buildings of modern towns, but has few edifices worthy of special note. It has several hospitals and educational institutions, and numerous churches. The chief features are the extensive arrangements for shipping grain, cattle, &c., along the river front, and it is a central terminus for a large part of the ocean, railway, and canal commerce of this portion of the States. In connection with this there are a large number of railway works, iron foundries, steel works, breweries, and tobacco factories. The population in 1880 was 120,722.

JERUSALEM (Heb. *Zerushalem*, Gr. *Hierosalem*, Lat. *Hierosolyma*, Arabic *El-Kuds*), the capital of Palestine. Geographically it is situated $31^{\circ} 46' 45''$ N. lat., and $35^{\circ} 13' 25''$ E. lon. of Greenwich, in the pashalic and about 125 miles S.S.W. of Damascus. Of all the cities of the earth it is perhaps the most interesting from its associations, and it is one that is regarded with veneration alike by Jews, Christians, and Mohammedans. In the present article we shall notice in order its history, topography, and present condition.

History of Jerusalem.—Like many other ancient cities the origin of Jerusalem is involved in obscurity. Josephus identifies it with Salem, of which Melchizedek was king, but this theory was opposed by Jerome, and is not accepted by modern scholars. It is more certainly identified with a city of Canaan taken by Judah and Simeon (Judg. i. 8), though the stronghold, then deemed impregnable, was retained by the Jebusites until the time of David. The latter, after the capture of the stronghold, made the place his capital, built himself a palace of wood, removed there the sacred ark and set up an altar for worship, and greatly strengthened its walls and defences. The original inhabitants do not appear to have been expelled, but continued to dwell there side by side with their conquerors until they became merged into them. Up to the time of David the city beneath the fortress seems to have been of very small dimensions, but as the "city of David" and the centre of the national worship, it increased considerably in size and the number of its inhabitants. Solomon enriched it by the erection of the temple, his own palace, a much larger structure, which took nearly twice as long to build, and by large additions to its walls. Under

the reign of Rehoboam it was plundered by Shishak, king of Egypt; it was besieged and taken by the Philistines and Arabians during the reign of Jehoram; and in the time of Amaziah it was taken by Joash, ruler of the northern kingdom, who not only plundered both temple and palace, but also broke down 400 cubits length of the wall. It was considerably strengthened and improved by Uzziah, and it appears to have successfully withstood a siege conducted by the united armies of Israel and Syria during the reign of Ahaz. HEZEKIAH added largely to its defences, and though it was twice threatened by the Assyrians during his reign, it was never taken. During the reign of Jehoiakim it was visited by Nebuchadnezzar after his victory over the Egyptians at Carchemish, was besieged, taken, and plundered by him during the reign of Jehoiachin, and after a short revolt was taken a second time by Nebuchadnezzar during the reign of Zedekiah, when the temple, palace, and all the other important buildings were burned, the walls were levelled to the ground, and all the wretched inhabitants who had escaped massacre were taken captive to Babylon. For a long period it remained a heap of ruins, but its memory was still cherished by the captives at Babylon, and on their return the city was gradually rebuilt and a new temple erected in its midst. The first caravan of returning Jews seems to have arrived 536 B.C., but the walls were not rebuilt until the time of Nehemiah, nearly a century afterwards, or about 445. Little is known of its history during the century following, though there is a tradition of a friendly visit on the part of Alexander the Great; but in 328 it was taken by Ptolemy I. of Egypt, and it remained in the hands of the Ptolemies until it was surrendered by the Jews to Antiochus the Great, 198. It was besieged, taken, and pillaged by Antiochus Epiphanes, 168, and it suffered a similar fate at the hands of Pompey, 63, and of Herod, 37. During the reign of the latter it reached perhaps its highest point of material prosperity, and he not only erected many important public buildings, but rebuilt the temple with great splendour. In the year 70 A.D. the great siege by the Romans, under Titus, so graphically described by Josephus, took place, and the city, after suffering the horrors of famine and fierce internal dissension, was taken and burned, the temple destroyed, and the greater part of the walls and buildings demolished. It was again, however, the centre of a fierce insurrection during the reign of Hadrian, who literally razed it to the ground, drew a plough over its ruins, and then rebuilt it as a Roman city under the name of *Ælia Capitolina*, forbidding the Jews to enter it under pain of death. In course of time this prohibition was relaxed, and as Christianity made progress in the world Jerusalem became a centre of interest, and was visited by pilgrims from every quarter. It is recorded that during the reign of Julian the Apostate the Jews were encouraged to return and rebuild their temple, but that their efforts were frustrated by an eruption of fire or by an earthquake. The city remained undisturbed by war until 614, when it was taken by the Persians under Chosroes II., king of Persia. On the defeat of Chosroes, 628, it was restored to the Emperor Heraclius, but in 637 it was taken by the Mohammedans under Omar, and it remained in their hands until it was stormed by the Crusaders, 15th July, 1099. [See CRUSADES.] For the next eighty-eight years it remained a Christian city, but in 1187 it was taken by Saladin. In 1517 it fell, along with Syria and Egypt, into the hands of the Ottoman Turks, and with the exception of the period from 1832 to 1841, when it was subject to the pasha of Egypt, it has ever since remained under Ottoman rule.

Topography.—An elevated limestone plateau of barren character, and broken up by alternate ridges and ravines—in some places utterly sterile and desolate, as if sown with salt, in others clothed with an attractive mantle of olive groves and luxuriant gardens—stretches from the plain of

Esdraelon towards the southern extremity of the Dead Sea. Nearly on a level with the watershed which separates the feeders of the Mediterranean and the Dead Sea, rises the loftiest crest of this undulatory table-land, sloping somewhat abruptly towards the rising sun, and finally terminating on the brink of the ravine which is known as the valley of Jehoshaphat. The bottom of this valley forms the channel of the brook Kedron—a winter torrent, completely dry for the greater part of the year—and on the opposite side swell the green ridges of the Mount of Olives. Southward runs another ravine, the valley of Hinnom, also watered by a rain-fed stream, which joins that of Jehoshaphat, and is itself a continuation of the shallower valley of Gihon on the western side. Between these ravines, and dominated over by the Mount of Olives, clusters the modern city of Jerusalem, divided into two equal portions by the Tyropæon, or valley of the Cheesemongers, which are again subdivided by two transverse glens or hollows; so that, in all, there may be distinguished four separate ridges or hills—Zion, on the south-west; Aera, on the north-west; Bezetha, on the north-east; and Moriah on the south-east. The culminating point of Zion, which is only partly inclosed within the present walls, rises about 300 feet above the lowest portion of the adjoining valleys, 2535 feet above the level of the Mediterranean, and 3835 feet above that of the Dead Sea.

From Mount Olivet is obtained the finest view of the city as a whole, a view thus graphically described by the Rev. Dr. Norman Macleod:—Towards the east, and between us and the Dead Sea, we see the wilderness of Judea, bare, bleak, and desolate, as would be the rocky bottom of the sea if upheaved and left to bleach beneath a burning sun. We see also a bit of the Dead Sea, more than 3000 feet below us, "lying dead in its trough." Though about 12 miles off, it looks very near. It appears hot and steamy, with a misty haze hanging over it. We cannot but associate all that is wild, lonely, and mysterious with this dismal lake. It does not suggest one noble thought, one act of greatness or goodness, done by man or woman alive or dead, to shed over it a redeeming ray of glory. We can also trace the course of the Jordan from its line of green vegetation. The memories of the great and good which it recalls are a relief to the mind. Its entrance into the Dead Sea seems like life losing itself in death. There rises also before the eye the great eastern wall of the ridge of Moab, the separation between modern civilization and almost unknown Arabia, with its ancient cities, far-spread pasture lands, arid wastes, powerful tribes, and primeval traditions. Standing on Olivet, one fully realizes the contrast between East and West, with Palestine as their connecting bridge.

From this point, continues Dr. Macleod, one also takes in at a glance the general topography of Jerusalem. He is struck with the sort of promontory abutting from the general table-land on which it is built; with the wonderful defence against ancient modes of warfare afforded by the valleys that, like deep ditches, surround it on east and south, hindering any enemy from coming near its walls; with the strong military positions which were afforded by the principal eminences within the city, such as the temple area, separated from Zion by the valley of the Tyropæon, and the high ground of Aera and Bezetha, eminences distinctly visible. The hills that surround Jerusalem are also visible, not only in the arching sweep of Olivet and its spurs, but further off in a ridge which stands as a wall between the city and the heathen tribes dwelling by the sea. One can see how it rested like an eagle's nest on a rocky eminence, or like a lion's lair, visible from every side, yet not to be approached with impunity. Its compactness must also have been one of its marked features. There were no human habitations beyond its gates.

South of the Mount of Olives, and, in fact, a continua-

tion of it, rises the Mount of Offence; south of the valley of Hinnom, the Hill of Evil Counsel; and to the north extends a billowy roll of mountainous summits, so that Jerusalem as a city is almost entirely encompassed with lofty heights.

Anciently its walls included the four hills already mentioned and a considerable area to the north and west of them, but those now standing comprise a less extensive space, and have a circuit of only 2½ miles. They were built by the Turks about three centuries ago, and vary in height from 20 to 50 feet. Constructed of great hewn stones, they are surmounted by a stout breastwork, loop-holed and battlemented, flanked at regular distances by strong towers, and pierced with four gates. These are—on the east, St. Stephen's Gate, called by the Turks *Bab-es-Sabat*, or "gate of the tribes," and opening on the brook Kedron, the Mount of Olives, and the picturesque village of Bethany; on the north, the Gate of Damascus, *Bab-el-Amud*, "gate of the pillar," in the line of the great road which leads to the beautiful Syrian city; on the south, the Gate of Zion; and on the west, the Jaffa, Hebron, or Bethlehem Gate. Near the latter, and on the loftiest point of Mount Zion, stands a citadel (also called David's Castle) and the Tower of Hippicus—a massive, battlemented, and turreted stronghold.

Entering the city we shall find that notwithstanding its sublime associations and the natural beauties of its position, it presents little in itself to attract or interest the pilgrim. The streets are narrow, dark, and ill-paved; the houses, though built of stone and with flat roofs, sometimes crowned with small domes, are dark, windowless, and prison-like; and a large portion of the interior consists of ill-built churches, monasteries, and mosques. The principal street is the well-known *Via Dolorosa*, or "way of sorrow," so named because the Saviour is said to have traversed it, bearing his cross, when passing to the last scene of his sacrificial career on Mount Calvary. It extends from east to west across the hill of Aera, bends to the north for a short distance, and again turning eastward, winds between the ridges of Bezetha and Moriah to St. Stephen's Gate. Another street of some importance runs in a direction nearly parallel to the former, from the Bethlehem Gate on the east, between the hills of Aera and Zion, to the bazaar, and afterwards continues to the Hill of Moriah. A highway from the Damascus Gate, through the centre of the city, and in a southerly direction, as far as the Gate of Zion, crosses these two streets nearly at right angles. Here, and in the bazaar, congregate the Jerusalem shopkeepers, who are mostly Christians, and exhibit a commendable activity in the disposal of their wares.

To enumerate all the interesting localities within the walls of the Holy City, the very metropolis of Christian faith and feeling, would be impossible in the narrow space to which we are necessarily confined. The first to which the Christian traveller directs his steps is the inclosure of Moriah, now called by the Mohammedans *El Haram-es-Sherif*, or "the noble sanctuary," and only thrown open to Christian visitors since the Crimean War. Its general shape is that of a regular parallelogram, its greatest length being 1500 feet, and its greatest breadth about 1000. On all sides massive walls surround it, some of them to the north and west serving also as walls of houses, which belong chiefly to civil or ecclesiastical officials. On the east and south they now form a portion of the city walls. Of this wide and open area a small space only is occupied by buildings. Nearly in its centre stands the mosque *El Sakrah*, or "dome of the rock," and at the south end the mosque *El Aksah*.

This sacred area is overgrown with rich grass and pleasantly besprinkled with the shadows of cypresses, olives, and other trees. But why is it sacred? Because it undoubtedly includes the site of the temple, that temple in

which Christ taught, and which was at once a symbol of the Old Testament and the New. A portion of this site is now occupied by the Mosque of Omar, a stately octagonal structure, seated on an elevated terrace, and approached by four porticoes, one of them graced with a superb marble colonnade, lighted by forty-eight windows of richly coloured glass, and crowned by a dome of magnificent proportions. Some remains of the great Jewish sanctuary are probably built up into this holy place of the followers of the Crescent. Mr. Fergusson (and few living authorities are entitled to more respect) is, however, of opinion that the mosque was never intended originally as a place of Mohammedan worship, but was raised by the Emperor Constantine as a church over the sepulchre of Christ. This sepulchre he finds in a cavern cut out of the living rock on which the mosque is built, and the summit of which rises above the floor of the cavern like a flat boulder, about 60 feet long and 50 feet broad, which lies immediately under the dome, and within the circle of marble pillars supporting it. An open door on the south-east side leads by a few steps down into a vaulted chamber hollowed out of the rock, about 8 feet high and 15 feet square, and here, according to Mr. Fergusson, the body of our Lord was laid.

The tomb usually identified with this memorable event is contained, however, in the so-called Church of the Holy Sepulchre, which stands on the northern ridge of the hill of Acra, and a short distance to the south of the Via Dolorosa. There can be little doubt that in this matter the popular tradition is erroneous, although the real site of the Holy Sepulchre is yet a matter of keen and apparently endless controversy. The Church of the Holy Sepulchre, so called, was built by Helena, the mother of Constantine the Great. It is a Byzantine pile of small architectural merit, but remarkable for the splendour of its internal decorations.

The other edifices of note are the convents, such as the Armenian (which can accommodate 1000 guests), the Latin, the Greek, and the Coptic; a chapel which marks, it is said, the site of the house of Annas; a building opposite the Gate of Zion, called the house of Caiaphas; and the lofty mosque which covers, according to the legend, the tomb of the sweet singer of Israel.

Much light has been recently thrown on the topography and antiquities of Jerusalem by the researches of Captains Wilson and Warren, who were commissioned by the Palestine Exploration Society. The result of their labours, so far as it relates to Jerusalem, was published in a very interesting volume, entitled "Underground Jerusalem," and, thanks to its maps, illustrations, diagrams, and clear and excellent descriptions, the present condition of the city and its neighbourhood is vividly portrayed. This work has since been carried on by Lieutenant Conder, R.E., and Mr. C. Schick, who have both made a valuable series of observations.

Present Condition.—The population of Jerusalem is about 21,000, which has been estimated to consist of Jews, 10,700; Christians, 5300; Mohammedans, 5000. There has been a considerable increase in the population during late years, especially in the Jewish element, and it is said that this is increasing through arrivals from Russia and Poland at the rate of over 1000 a year. The great festival of Jerusalem is at Easter, when pilgrims arrive from all parts, and by the variety of their national costumes give to its narrow streets a striking and interesting appearance. As a commercial centre it possesses few or no advantages, and its trade is of a very limited description. Many of the Jews devote themselves to the study of the law, and are sustained by offerings from their countrymen in all parts of the world, and the largest part of the Christians in Jerusalem consists of either priests, monks, or nuns. The chief branches of industry are the manufacture of

soap and the fabrication of rosaries, crucifixes, and cameos, carved in olive wood and mother of pearl. For the beads of the rosaries berries and date stones are also used, and for Mohammedan visitors large numbers of annulets are made from a black stone, which have a high reputation for affording protection from the plague. One of the chief drawbacks to the city is an insufficient supply of water, the methods adopted in earlier times to overcome this defect having been allowed to get out of repair under the careless rule of the Turks.

Jerusalem is the seat of a patriarch of the Greek Church, and also of a patriarch of the Roman Catholic Church, while in 1841 the governments of England and Prussia united in the formation of a Protestant bishopric, the bishop being appointed alternately by each country.

For works in relation to the Holy City we recommend the reader to consult Josephus, "Antiquities," and "Wars of the Jews;" Gibbon, "Decline and Fall of the Roman Empire;" Mills and Michaud, "History of the Crusades;" Dr. Robinson, "Researches in Palestine;" Wilson, "Lands of the Bible;" Fergusson, article "Jerusalem" in Dr. Smith's Dictionary; Dr. Williams, "Holy City;" Rev. W. Sandies, "Sinai and Jerusalem;" Lewin, "Siege of Jerusalem;" Finlay, "Greece under the Romans;" Porter, "Handbook to Syria and Palestine;" Dean Stanley, "Syria and Palestine;" Dr. Norman Macleod, "Eastward;" and Warren's "Recovery of Jerusalem" (1871).

JERUSALEM ARTICHOKE, the name of a plant (*Helianthus tuberosus*) belonging to the order COMPOSITÆ. It is a well-known culinary plant, its tubers affording a wholesome food, somewhat akin to the common potato. It is a native of the north-east of North America, and is first mentioned in 1616 as being seen in Europe in the garden of Cardinal Farnese at Rome. The word Jerusalem is a corruption of the Italian *girasole* (sunflower), and artichoke refers to a supposed similarity in taste with that vegetable.

JERVIS, JOHN, Earl of St. Vincent, a British admiral, was born at Meaford in Staffordshire, 9th January, 1734, O.S.; entered the navy at ten years old; rose to be captain; fought in Keppel's action in 1778; and captured the *Pégase*, French, seventy-four, in 1782, for which he received the order of the Bath. On the breaking out of the French revolutionary war he sailed in command of a squadron to reduce the French West India Islands, and captured Martinique, Guadeloupe, and St. Lucia. He was promoted to be admiral of the Blue, 1st June, 1795, and in the autumn took command of the Mediterranean fleet, with which he intercepted and defeated the Spanish fleet off Cape St. Vincent, on 14th February, 1797, for which he received the thanks of both Houses of Parliament, was raised to the peerage by the title of Earl of St. Vincent and Baron Jervis of Meaford, and received a pension of £3000. In 1798 the mutiny which broke out in the Channel squadron spread to the Mediterranean fleet, but was suppressed by his judicious and decisive severity. In 1801 he was made first lord of the Admiralty in the Addington ministry. On Pitt's return to office in May, 1804, he placed Viscount Melville at the head of the Admiralty. Earl St. Vincent again took command of the Channel fleet in 1806 in Fox's administration, but held it only for a year. He was appointed admiral of the fleet on the day of George IV.'s coronation, 19th July, 1821, and died 13th March, 1823, in the ninetieth year of his age. A monument has been erected in honour of him in St. Paul's Cathedral.

JES'SANT is a heraldic term for a charge rising out of the bottom line of a field or the upper line of an ordinary. It is synonymous with *issant*.

JESSEL, SIR GEORGE, an eminent English judge, son of Zadok Aaron Jessel, a Jewish merchant of London, was born in 1824. He studied at the London University, and in 1843 took his degree of B.A., obtaining the highest

honours in mathematics and natural philosophy. The following year at the M.A. degree he took the gold medal for mathematics. Devoting himself to the legal profession he was called to the bar in 1847, and for several years practised conveyancing with only moderate success. In 1865 he became a queen's counsel, and elected to practise in the Rolls Court, where he obtained an extensive and lucrative business, and rapidly rose to the position of leader of the bar. In 1868 he was returned to Parliament for Dover, and became solicitor-general under the administration of Mr. Gladstone in 1871. He was not very successful as a debater in the House, but as legal adviser to the government he displayed powers of such high order that in 1873 he was appointed master of the rolls in the place of Lord Romilly, who had resigned. Of Jewish parentage, he remained throughout life faithful to his ancestral religion, and hence Sir George Jessel was the first Jewish judge appointed in England. Though not disqualified from sitting in the House of Commons, he at once retired from parliamentary life and devoted himself to the duties of his new office with such energy and ability as to speedily attain an immense reputation. Never before in the history of the court had its business been despatched with such marvellous rapidity, and if ever it happened that his judgments were reversed on appeal it was more on the bearing of facts and details about which any two lawyers might differ than upon legal principles. Possessed of a wide knowledge of law, a master of the principles of equity, his influence upon the administration of justice was of a very marked character, and many of his judgments are not only models of orderly arrangement and scientific induction, but great efforts of creation. By the Judicature Act of 1873 the master of the rolls became a member of the Court of Appeal as well as a judge of the first instance, but after the passing of the Act of 1881 he ceased to be a judge of first instance, and Sir George Jessel left the Rolls Court and regularly presided over the branch of the Court of Appeal to which chancery business is assigned. In 1880 he was unanimously elected vice-chancellor of the University of London, and he was the first London graduate who ever held this office. In 1882 his health showed signs of failing, but he persisted in the regular discharge of his duties until the beginning of the following year, when after a short illness he died 22nd March, 1883.

JESSES, short straps of leather tied about the leg of a falcon, whereby it may be held upon the wrist. The jesses generally had small bells attached to them, to give a merry sound as the falconers walked to the meet. The word is a corruption of the old French *jets* or *jets*, from the verb *jetter*, to cast off, which of course is but the Latin *jacitare*. When the prey was in sight the hawk was *cast off* to pursue it, hence the term jesses for the bonds which held it up to that moment.

JESUATES, a religious order founded in Italy and approved by Urban V. (of Avignon) in 1367. They were suppressed and their possessions given to the Hospitallers of Italy, 1668.

JESUITS or **SOCIETY OF JESUS**, more properly "Company of Jesus," a religious order in the Roman Catholic Church, founded by St. Ignatius Loyola. Don Iñigo (Ignatius) de Recalde, lord of Loyola, changed, by reading the "Lives of the Saints," from an ardent soldier into a fervent follower of Christ crucified, conceived the notion of a body of men who, taking Jerusalem as their centre of activity, should devote themselves to the conversion of the pagan nations of Asia and Africa. They were to be Christ-like men in life and aim, bent on following him in his way of living and his labours, and devoting themselves, in their companionship with him, to the work of making his Father-king over the souls of all men. This conception led him, a few years after his conversion (1521), to undertake a pilgrimage to Jerusalem, travelling

on foot all the way from Barcelona to Venice. As the Sultan was then at war with the Christian princes, no pilgrim was permitted to sojourn long in Palestine, or to visit the holy places, except with extreme precautions. Ignatius was therefore compelled to return to Venice, after suffering great hardship on his way back and forth. He was only confirmed in his purpose to go thither better prepared for his work, and accompanied by such men of good-will as would co-operate with him. He had become convinced of the necessity of a careful and complete training in worldly knowledge and sacred science for men devoted to the work of the apostleship. He therefore began, on returning to Spain, the study of the classical languages, endeavouring meanwhile to influence the most promising young men in the schools, and to bind them to himself for the great purpose he had in view. In this, however, his intentions were frustrated by the Spanish Inquisition, which first questioned his orthodoxy, and then acquitted him honourably. But his companions deserted him, and he deemed it wiser to seek in the schools of Paris both the instruction and the associates he needed. One by one he won over to his purpose six of the most distinguished students of the university, making each pass through the ordeal of the "Spiritual Exercises" (of which more presently) till, on 15th August, 1534, in the Church of Montmartre, all seven bound themselves by vow to the practice of chastity and religious poverty, to go to preach the gospel in the Holy Land as soon as their studies were finished, or, this not being possible within a year thereafter, to offer their services to the Pope, and permit him to dispose of them as he would judge best. These six companions of Loyola were Peter Favre, a Savoyard, the only one of their number in priest's orders; Francis Xavier, Diego Laynez, Alfonso Salmeron, and Nicholas Bobadilla, Spaniards; and Simon Rodriguez, a Portuguese. When they started on foot for Italy, at the end of 1536, three others had joined them—Claude Le Jay, a Savoyard; John Codure, and Pasquier Brouet, Frenchmen. The nine, after great hardships and danger, arrived in Venice in January, 1537; Loyola, who had been obliged to visit Spain, arriving later. War having broken out between Turkey and Venice, the journey to the Holy Land was out of the question. Loyola, therefore, with Favre and Laynez, went to Rome to offer themselves and companions to Paul III., who approved of their devotion, granted them permission to receive holy orders, and to display their zeal in catechizing, preaching, and visiting the sick, Favre and Laynez being commissioned to lecture on divinity in the University of the Sapienza at Rome. In spite of the great good achieved by their labours throughout Italy, and of the universal veneration shown them by the people, the idea of allowing them to form a new religious order met with determined opposition among the cardinals. However, Paul III., by a bull of 27th September, 1540, approved of the brief form of mode of life presented to him by Loyola. This specified preaching, spiritual exercises, works of charity, catechizing little children, and hearing confessions. It was apostolic work to be done among the people, and was done so thoroughly and with such extraordinary success by men who were popularly judged to be filled with the spirit of Christ, that all the cities of Italy and the adjoining countries vied with each other in demanding their services. Meanwhile their numbers increased rapidly by the accession of men the most distinguished for learning, rank, and virtue. The Pope now demanded that Ignatius Loyola should draw up constitutions for his company, and that it should be governed by the hierarchical form assumed by all religious orders. Ignatius was unanimously elected superior-general, entering on his office in April, 1541, and immediately, by the direction of his associates, set himself to work to prepare the constitutions. This work, entirely his own, written by himself in Spanish, and translated

into Latin by his secretary, Polanco, is now, together with the "Rules," the "Ratio Studiorum," the "Decrees of the General Congregations or Conventions," and the "Ordinances" of the various generals, accessible to scholars everywhere in both hemispheres. It has been pronounced in our own day, as in the past, by eminent Protestant churchmen and scholars, as well as by eminent Roman Catholics, to be a masterpiece of human wisdom. It still regulates the actions, labours, and lives of the great Jesuit order in civilized society and in missionary countries; it formed the men whose existence fills so large a space in modern history, and in the discussions of statesmen, theologians, historians, and moralists. Every Jesuit receives his moulding and formation in the Spiritual Exercises of Ignatius Loyola; the constitutions themselves are but the development of these exercises. The society thus constituted before the death of its founder belongs to the family of Clerks Regular (*Clerici Regulares*), as distinguished from monks and orders leading a secluded life. The former are priests bound, indeed, by a rule and monastic vows, and living in community, but still devoted to active ministrations among the people; the latter aim principally at leading a life of seclusion and contemplation. The Jesuits differed in other respects from the then existing monastic orders; they were not subjected to chanting *in choro* the canonical office; the period of novitiate was extended to two years instead of one, a change afterwards made obligatory for all religious orders by the Council of Trent; the period of novitiate over, only simple vows were taken and renewed every six months, for a period varying from ten to twelve or fifteen years according to the degree in the order for which the candidate was destined. These innovations, which caused at first a great outcry against the Jesuits, have been imposed on all orders by Pius IX. Though devoted, at home and abroad, to the most arduous labours of the priesthood, the Jesuits are subjected to daily ascetic practices of vital importance—such as the morning meditation and the examination of conscience. From these no one is exempted. Ignatius Loyola to his dying day never relinquished the hope of making Palestine the central field of the company's labours. His first conception of his order (1521) had no relation to Luther and the Reformation, but after 1546 the Jesuits in Italy and elsewhere bore a prominent part in opposing and driving back the Lutheran movement.

The avowed aims of the company thus constituted were:—(1) The education of youth; (2) preaching, and otherwise instructing adults in matters of religion; (3) defending the Catholic faith against heretics and unbelievers; (4) propagating Christianity among the heathen and other infidels by means of missionaries. In these objects the new society merely aimed at the same work that had been attempted by the older orders, but in its methods it broke with many of the old traditions altogether. To the threefold vows of chastity, poverty, and obedience, another was added whereby the professed members bound themselves to go as missionaries to any country which the Pope might indicate to them, "without hesitation or delay as without question, condition, and reward." The system of government imposed by the constitutions is a strong one. The founder insists on perfect obedience to all superiors. But it is a mistake to suppose that it is a blind or unreasoning obedience. Loyola supposes that what is commanded is never sinful or wrong; and that the will of an inferior can never be subjected to the committing of what conscience or the divine law forbids. The general, appointed for life by the suffrages of the representatives of the whole company, is strictly bound by law, and his action is controlled by the assistants, a council also elected at the same time that he is. General Tyrso Gonzalez was deprived of the government of the company, and given a vicar-general, for having violated the constitutions.

Quite recently the extreme old age and infirmities of the general, Father Beckx, have compelled the company to appoint a vicar-general, with right of succession, and a new council of assistants. All superiors are subject by the constitutions to laws which regulate their action.

As originally constituted, these several grades consist of novices, scholars, coadjutors temporal, coadjutors spiritual, the professed of the three vows, and the professed of the four vows. A novice cannot be admitted at an earlier age than fourteen, and is required to spend two years in study, works of charity, and teaching the poor. If accepted at the close of this period, the novices pass into the grade of scholastics, in which they pass through a course of five years in arts, a similar period in school teaching, several years in the study of theology, an entire year spent in spiritual exercises, as in the first novitiate; and not until the termination of this period can the grade of spiritual coadjutor of the society be attained. The lay brothers reach the degree of "formed temporal coadjutors" after ten years service. The degree of "formed spiritual coadjutor" is granted to priests who are not fitted for the higher theological or scientific attainments, and who are otherwise gifted with great piety and an aptitude for government. From this class are taken most of the inferior officers of the company—the superiors of houses, &c. They are in ordinary life in nowise distinguished from the professed. The profession of three vows is an exceptional grade bestowed on a few only. The professed of the four vows form the body proper, the *élite* of the company. This degree is conferred in due course on those who have passed through the long course of probation in use in the order—generally, for those who enter young, lasting about fifteen years. Besides the fourth vow binding the professed member to special obedience to the Pope, there are simple vows subscribed to on the day of profession, imposing stricter obligations to sanctity, one in particular binding the professed members never to seek any office or advancement in the company or in the church, and to denounce such of the members as he knows to be seeking such advancement. To the professed of the four vows are reserved the offices of general, assistant, provincial, elector, &c.; but they are, generally speaking, subjected to the government of the spiritual coadjutors. The administration and government of the company is carried out by means of a division into great districts, with a provincial appointed by the general at their head, and in each district there are three kinds of communities—professed houses, colleges, and novitiates. Every appointment is vested in the hands of the general, and no electoral right or power of recommendation is permitted. The superiors of all professed houses and colleges are required to report weekly to their provincial concerning all business transacted, a summary of which information is sent monthly to the general. There is also a quarterly report sent from each house independently of the provincial to the general, and the superiors of houses have the right to communicate directly any matter of importance. Beyond this each member is interested in the conduct of the others, and here comes in one of the points of their discipline which seems odious to outsiders. Every candidate for admission is asked if he is willing to renounce his natural right of being admonished of outward faults observed in his conduct, and to allow any one so observing them to report the same directly to the superior. This was intended by the founder to avoid breaches of charity among the members, and to transfer to the superior alone the right of admonition. The superiors of houses at stated times are bound to transmit to the provincials and the general all such necessary information about the character and capacity of each of their subjects as may enable the general to give every one of his inferiors the office for which he is best fitted. Throughout the whole, the duty of

prompt unquestioning obedience is enforced, the society having ever professed to adhere to the rules of Loyola in this respect. These rules are to be found in his "Letter on Obedience," "Spiritual Exercises," and "The Constitutions" of the society. In the first of these he lays down the principle that beyond entire submission to command, the inferior's will must be identified with the superior's, and the latter must be obeyed with inward affection as well as outward act. By many of the opponents of the society it has been alleged that in addition to the published regulations of the founder, the more advanced of the Jesuits are bound by a code of secret laws, and in 1612 a work entitled "Monita Secreta," professing to give these laws and secret instructions, was published at Cracow. It has, however, been fully proved that the book is a forgery, and the members of the order strenuously deny the existence of any such code or series of instructions. There never has existed any body in any way affiliated to the Company of Jesus. The above classes of members are confessedly the only persons in the present or in the past who can lay claim to belong to it. Ignatius Loyola would have no third order, and especially would not have the company hampered by the direction of nuns.

The Jesuits very shortly after their establishment began to play a distinguished part in the affairs of Europe. While Loyola remained at Rome perfecting the original draft of the constitutions, the other members were sent to Ireland, Naples, Germany, Spain, and Portugal. In the three latter countries they were eagerly welcomed, and in a short time they had gained a footing in France also. At the Council of Trent three of its members, Laynez, Favre, and Salmeron were appointed to act as his theologians by the Pope, and they exercised considerable influence in the framing of its decrees. Loyola died in 1556, but he was succeeded by Laynez, under whose rule the order continued to make rapid progress, and at his death in 1564, or twenty-four years after the foundation of the society, it included eighteen provinces with 130 colleges. Among the reasons for their rapid increase may be assigned the compactness and cohesion, combined with the concentration of power, which the new system afforded. Then they adapted themselves to the requirements of the times by mingling ever in society, by the careful cultivation of learning, and by their zeal in educating the young. Casting aside the antiquated methods of teaching that had hitherto prevailed, they introduced new and improved modes, the results of which were quickly perceived and gave their schools great popularity. Beyond their additional skill there was also the fact that they taught gratis, and wherever they opened a college free education of the best character was available for the youth of the district. From these schools, also, they gathered such of the pupils as displayed the highest talent, and thus obtained valuable recruits for the order. Lastly, they used to the full degree the power and influence given by the confessional. They soon developed a system of casuistry which was certainly devoid of excessive rigour, and while Loyola obtained exemption for the order from acting as confessors to convents of nuns, he laid great stress upon the duty of accepting this office for persons of rank and authority in the world.

To indicate even in outline the history of the society during the period of its rise, declension, and restoration would be impossible within the limits of the present work. During the first century of the existence of the society its members penetrated to every country of Europe, and exercised both open and secret influence of enormous extent over the course of public events. In many places they were received with great hostility, but they certainly greatly checked the progress of the Reformation, and it has been remarked that the influence of Loyola over the Catholic reaction was as great as that of Luther had been in the establishment of Protestantism.

The missions of the Jesuits form an important part of the history of the society. By the efforts of Francis Xavier, Ricci, Schall, and others, missions were planted in India, China, and Japan. In the latter place numerous congregations were established, but the Christians of that country were thought to have been exterminated by Taico-Sama in 1637. When, after 1654, Americans and Europeans were admitted to Japan, it was discovered that there were still many thousands of Christians there. In the persecution directed against them after 1860, consular reports state that between 20,000 and 30,000 were subjected to imprisonment or exile. In China, the controversy about Chinese rites, raised by the Dominican missionaries at their arrival there in 1633, ended in ruining or impeding the existence of the Jesuit missions. The Dominicans affirmed that the adherence by the converts to reverential customs and ceremonies in honour of ancestors could not be distinguished from idolatry. This the Jesuits deny to the present day. In 1706, De Tournon, patriarch of Antioch, sent to China to judge the controversy by Clement XI., condemned the ceremonies as unfit for Christians. The emperor, Kiang-Hi, sent the legate a prisoner to Macao, where he was detained in confinement and ill-treated by the Portuguese till his death in 1710. In this same year Clement XI. confirmed the condemnation, which he repeated more solemnly in 1715. The new legate, Cardinal Mezza-Barba, took a different view of the question, and authorized the Jesuits to continue the practice while appealing to Rome for a revision of the case. It was decided against them by Benedict XIV. Although frequently persecuted they have never lost their hold upon China, and to this day they have extensive missions there. The war at present waged by France against that country threatens the destruction of the numerous flourishing missions established there by the French Jesuits. In India the missionary labours of Father de Nobili were very successful. He assumed the dress and manner of living of the Brahman class, and mastered the native language, in which he wrote works still looked upon as classic. His method of propagating the gospel was approved of by Gregory XV. in 1623. Other missionaries cultivated this field, among them John de Britto, beheaded by the King of Marava in 1693. But the means used to convert the Brahmans forced the missionaries only to communicate in great secrecy with the Pariah classes; and then arose the vexed question of the Malabar rites, which had almost as disastrous consequences as that of the Chinese ceremonies, and ended in the same way. Nevertheless, the Jesuit missions in Malabar survived these discussions, and are flourishing still. In Paraguay, where they had an open field for the display of their abilities, they formed, on the banks of the Paraguay and the Parana, a flourishing colony of Indian converts, who are said to have amounted to more than 100,000, whom they instructed in the elements of civilization and religion. Other missions, also very successful, were those of Uruguay, California, and the Philippine Islands.

In the seventeenth century the wealth and power of the society attracted a large number of adherents, but at the same time serious relaxations of discipline crept into some provinces of the order, and many of the rules of the founder being systematically disregarded, the enemies of the society began to make their power felt. The political influence of the society could not be exercised without raising up many enemies to the order, and its system of free education was greatly opposed to the interests of the different schools and colleges which depended upon fees from the scholars. Then the French Jesuit missionaries in the West Indies had obtained permission from the Pope to send to the markets of France the produce of their extensive farms, and, under the enterprising Father Lavallete, the procurator of the mission, a great regular trade had

sprung up. A series of disastrous shipwrecks ruined his credit and brought on bankruptcy. The government and the *parlement* being then hostile to the Jesuits, the entire company was held responsible for the debts. Besides that, Madame de Pompadour, then all-powerful, the Encyclopedists, the university, the Jansenists, and the *parlements* had united to crush the order. The outcry of the mercantile classes afforded a pretext. In Rome, Cardinal Passionei, an open enemy and suspected of Jansenism, had been chiefly instrumental in obtaining the final condemnation of the Chinese rites and the severe censure of the missionaries for their supposed contumacy. Another Pope, however, Clement XIII., repeatedly vindicated the order from the grave charges brought against it.

A few years after this, the storm that had long been brewing burst upon the order, and its fury was not spent until the society was almost extinct. In 1753 Spain and Portugal exchanged certain provinces in South America which involved the transfer of the inhabitants, but the latter, who were largely under Jesuit influence, refused to migrate, rose in rebellion, and successfully resisted the Spanish and Portuguese forces. This was bitterly resented by the authorities of the two countries, and the Portuguese minister Pombal never rested until he had succeeded in obtaining the expulsion of the Jesuits from both Portugal and its dependencies. France was the next to follow in the same course of proscription. The Duc de Choiseul, who was prime minister in 1762, was a creature of Pompadour and a freethinker. The scandal caused in the law courts by the suits against Father Lavallette was still more increased by a formal examination of the constitutions of the Jesuits ordered by the *parlement*. These constitutions were declared incompatible with the laws of France. Finally, the company was suppressed by royal decree, November, 1764, confirming the edict of *parlement*; in 1767 all Jesuits were expelled from France. The same year marked their expulsion from Spain. The King of Spain, Charles III., a devout Catholic, is said to have become convinced that they were plotting against his authority, and he determined to suppress them. Sealed despatches, to be opened 2nd April, 1767, were sent to every Spanish colony, abolishing the order in the Spanish dominions, and throughout the whole of Spain. In the latter country, the colleges of the Jesuits were surrounded at midnight by troops, sentinels were posted at every door, the bells were secured, and the king's commissioners, having roused and assembled the respective communities in the refectories, read to them aloud the royal decree which expelled them from Spain. Six thousand priests were at once shipped to Italy, where the Pope and the general of the order refused them admission, and they were compelled after severe sufferings, in which large numbers perished, to land in Corsica. In 1768 the King of the Two Sicilies and the Duke of Parma suppressed the society in their dominions. Clement XIII. ever since his election (1758) had been besieged by the ambassadors of the Bourbon courts with an urgent petition to suppress the Jesuits. He replied by defending them. He died in 1769, and immediately every effort was made to secure the election of a Pope who would suppress the order. Clement XIV. was chosen, after pledging himself in some way to do so; and it is an historical fact that he only fulfilled his promise under the most violent pressure, especially from the Spanish ambassador. On 21st July, 1773, the bull of suppression was issued, stripped of its usual formalities. The Jesuits everywhere obeyed with an unhesitating obedience which won the praise even of their enemies. In consequence of this, the Jesuits were banished from the Sardinian monarchy, the Austrian dominions, and every Catholic state. Two powers only—Prussia and Russia—one Protestant and the other Greek-Catholic, and both ruled by free-thinkers, Frederick the Great and Catharine II., allowed

the fathers an asylum, and continued to intrust them with the education of their Catholic subjects. They made Russia their headquarters, where they elected three Poles successively as vicars-general, and in 1801 they were permitted by the Pope to reorganize themselves in North Russia, and in 1804 to re-establish themselves in Sicily. It was not until 7th August, 1814, that the complete rehabilitation of the order was effected by Pope Pius VII. by the publication of the bull *Sollicitudo Omnium Ecclesiarum*. In 1824 the Collegio Romano, their principal school in Italy, was restored to them. Since 1870 they have had no legal standing in Italy. A few missionaries maintain here and there an irregular existence, barely tolerated by the government. In France they reappeared as missionaries in 1814, and soon ventured to open a few colleges. Alternately banished and allowed to return under Charles X. and Louis Philippe, they enjoyed comparative liberty from 1848–80, their numerous colleges and special schools rivalling those of the university. In 1880 they were again suppressed. The Franco-German War was attributed to the influence of the Jesuits; but there exists no evidence of the fact. The Jesuits were active as chaplains in both armies; and their dearest interests in both countries depended on the good-will of the respective governments. Their supposed influence in bringing about, in 1870, the definition of the doctrine of papal infallibility, raised against them in Germany a fierce storm of misrepresentation. On 19th June, 1872, the Falk laws banished them from the empire. They were expelled from Russia in 1820, and from Holland in 1816. Their houses in Belgium have always been flourishing, although bitterly denounced by the Liberals. In Great Britain and Ireland their houses enjoy a very high reputation, entering into keen competition with the universities and scientific schools. In the United States they possess no less than thirty colleges, besides admirable missionary centres in the territories. In 1626 the company counted 15,000 members, and 20,000 at the time of the suppression in 1773. At the present time they still number some 10,000.

JESUS CHRIST. The word Jesus is the Latin form of the Greek *Iêsous*, a name which corresponds to the Hebrew *Yehoshua*, contracted to *Yeshua* or *Joshua*, "help of Jehovah." It was a common name among the Jews, and in its Hebrew and Greek forms it occurs several times in both Testaments. The word Christ was originally a title meaning in the Greek "anointed," but in the New Testament it is used as equivalent to the Hebrew term "Messiah," the pre-eminently anointed one, the long-expected deliverer of the nation. In the Gospels, where it occurs about forty times, it is usually given as a title, "the Christ;" but in other parts of the New Testament, where it occurs over 200 times, we find it is generally used as a proper name, and this usage has ever since been retained.

For our information concerning the life and teachings of Jesus we are dependent almost entirely upon the books of the New Testament, as there are scarcely any independent traditions concerning him which have come down from either Christian, Jewish, or heathen sources that are worthy of attention. By many scholars it is supposed that the earliest written references to the life of Jesus extant are those which may be found in the earlier epistles of St. Paul. All the epistles are rich in their allusions to Jesus, and from the four unchallenged epistles alone—viz. 1 and 2 Corinthians, Galatians, and Romans, a comprehensive creed concerning his nature, office, teaching, life, death, and resurrection, may be collected. If, however, we accept the theory of Dr. Abbot concerning the origin of the Synoptic Gospels, we have in the "triple tradition" they contain the earliest oral teaching of the apostles concerning Jesus, and this must have preceded by many years the writing of the earliest of the epistles. Certainly it is from the Gospels we derive almost the whole of our knowledge of Jesus, and

it is from their fourfold narrative that we are able to form an estimate of his life and teachings.

THE GOSPELS are fully treated of in the article under that title, and for our present purpose it is only necessary to mention that in all probability the first three Gospels were written during the lifetime of the apostles, their material being evidently derived from some common source, while the fourth Gospel, though evidently written much later, is still generally believed to have been published about the close of the first century from the birth of Christ. Written independently, and from different individual points of view, considerable difficulty has always attended the efforts of commentators to harmonize these narratives, and though much has been accomplished in this direction, there are some questions which in all probability can never meet with a complete answer. At the same time the main outlines of the life of Jesus are indicated in the clearest manner, and it is by no means difficult to gather from these records the leading incidents of that unique and wondrous history.

The exact date of the birth of Jesus cannot be fixed with absolute certainty, but it is clear that the present Christian era, which was first fixed in the sixth century by Dionysius Exiguus, an abbot of Rome, is incorrect. Nearly all chronologers are agreed in fixing the years A.U.C. 749 or 750 as the real date, or about four years before the beginning of the present era. For the circumstances attending the birth of Jesus we are indebted to two of the evangelists, St. Matthew and St. Luke, and their accounts are strikingly independent of each other. In both narratives the miraculous conception of Jesus is recorded, the details given by St. Luke being much more full and elaborate than those of St. Matthew, and both assign Bethlehem as the place of his birth. St. Luke records the annunciation by the angels to the shepherds outside Bethlehem, the presentation of Jesus in the temple, and the testimony of Simeon and Anna; while St. Matthew, omitting all reference to these events, alone narrates the incidents of the visit of the "wise men from the east," the massacre of the children of Bethlehem by Herod, and the flight of Joseph and Mary into Egypt. There is no difficulty in reconciling the two narratives, and the only serious objection that has been made concerning the date of the enrolment made under Quirinus has recently been shown by Zumpt to be capable of a simple and easy explanation. Both evangelists are agreed in making Nazareth in Galilee the place in which the childhood and youth of Jesus were passed, and we learn from St. Luke that this was the original dwelling-place of Joseph and Mary. The province of Galilee at this period was the seat of a numerous and active population. The estimate of Josephus, which gives it 3,000,000 people, like many other statements of that historian, must be taken with great reserve, but there is abundant evidence that at this period the district was both rich and well populated. The village or hamlet of Nazareth is not mentioned either in the Old Testament or by Josephus, and it seems to have possessed no political importance whatever. It was situated on the side of a narrow vale, and was shut in on all sides by the hills which constitute the south ridges of Lebanon just before they sink into the plain of Esdraelon. The environs of the place must always have been very beautiful, and from the hills immediately around it wide views may be taken of the surrounding country. The inhabitants of Galilee were looked upon with some disrespect by the people of Judea, partly because they dwelt among the heathen, Phœnicians, Syrians, Arabs, and Greeks, in addition to the all-pervading Roman garrisons being found in the province, and partly on account of their ruder and harsher dialect. The hamlet of Nazareth, in addition, seems to have had some special local reproach attached to it, if we may judge from the remark made by Nathanael,

himself a Galilean, given in John i. 46. Very little is recorded by the sacred historians as to the early life and training of Jesus, and there is only one authentic anecdote preserved—viz., the incident of his visit, at the age of twelve years, to the temple, which is given by St. Luke. From some incidental expressions in the Gospels, and the circumstances attending the public ministry of Jesus, we may gather that in common with most Jewish children of that period he was well instructed in the sacred law and the other writings of the Old Testament. It is clear also that he learned to read and to write, and in addition to the vernacular Aramaic he was acquainted with the ancient Hebrew, and possibly also with Greek, which at that period was largely spoken in Palestine. It is not easy to understand what were the family surroundings of Jesus, and the questions raised by the references in the New Testament to the "brothers of the Lord" have not up to the present received a wholly satisfactory solution. Joseph is not mentioned after the incident of the temple visit during the boyhood of Jesus, and it is generally thought that he died while Jesus was yet a youth. From Matt. xiii. 55 we learn that Joseph followed the occupation of a carpenter, and from Mark vi. 3 that Jesus worked at the same business; and thus earning his daily bread by humble manual toil in an obscure and despised village, his life was passed in great retirement until "he began to be about thirty years of age." At this time the Jewish people were startled by the preaching of John the Baptist in the wilderness of Judea. In his ascetic habits, wild appearance, and stern denunciations of evil, they recognized that there was again a prophet in their midst, and his message that the kingdom of heaven was at hand, that the Messiah should soon appear to soft and purge the nation, and that repentance and amendment of life were required to prepare his way, met with a ready response from large numbers of the people. The scribes and Pharisees were too firmly encased in their traditions, and the priests too fully impressed with the sense of their own importance, to be affected, but all the people regarded John as a prophet. John in his turn showed but little respect to the self-constituted guides of the people, but rather rebuked them with great severity (Matt. iii. 7). Those who accepted his teaching were required to submit to an initiatory rite of baptism, and to observe certain fastings and austerities as part of their religious life, so that "John's disciples" formed a sect or party among the Jews which lasted for many years after the death of its founder, as we learn from Acts xix. 1-7. In answer to all inquiries John declared that he was not the expected Messiah, but only his forerunner; he was "the voice of one crying in the wilderness, Prepare ye the way of the Lord." To John came Jesus for baptism, and the incidents of the ceremony are noticed briefly by all the Synoptics, and given with more detail in the Gospel according to St. John. The incident of the descent of the Holy Spirit in the form of a dove is recorded by all the evangelists, and that of the testimony of a voice from heaven at the same time by all the Synoptics. From the latter we also learn that this event was followed by a prolonged period of fasting in the wilderness, where Jesus encountered and vanquished the temptations of the devil, three of which temptations are given by Matthew and Luke. It was from this period that the public ministry of Jesus commenced, and there is a general consensus of opinion that its duration extended to about three or three and a half years. The evidence for this is derived chiefly from the fourth Gospel, which, being mainly taken up with the ministry of Jesus in Judea, mentions his attendance at three passovers, the Synoptics mentioning only one. It must be remembered, however, that neither of the evangelists professes to give a chronological record of the life of Jesus, and that the fourth Gospel was written to some extent as supplementary

to the others. In consequence of this disregard of chronology it is impossible to follow with certainty the whole of the movements of Jesus, and the order of his journeyings, miracles, discourses, parables, and controversies has been somewhat differently arranged by critics and commentators. In the present article we follow chiefly the harmony arranged by Dr. Robinson, in which the order of the fourth Gospel is taken as a basis, the matter of the Synoptics being introduced, sometimes following but often inverting their own order.

The return of Jesus from the wilderness was followed by the gathering around him of a few disciples, who were also Galileans, Andrew and another, probably John, disciples of John the Baptist, being the first. These were followed by Simon Peter, Philip, and Nathanael, afterwards termed Bartholomew, all of whom were subsequently appointed apostles by Jesus. In company with these, and possibly some others, Jesus returned to Galilee, where his first miracle was wrought at the marriage feast of Cana. From Cana he passed to Capernaum, and after a short stay there, went with his disciples to Jerusalem to celebrate the passover, and while there we learn from St. John he cleansed the outer courts of the temple from the traffic which had been allowed to invade them. A similar cleansing is recorded by the Synoptics in connection with the last passover. The fourth Gospel refers also to a display of miraculous power at Jerusalem at this time, though no details are given; and it was during this visit that Nicodemus, a member of the Sanhedrim, came by night to Jesus. From Jerusalem Jesus, who had taken up the work commenced by the Baptist and begun to proclaim a similar message (Mat. iv. 17), proceeded also to the Jordan, where his disciples baptized those who came to him. This circumstance appears to have aroused the jealousy of the disciples of the Baptist, whose answer to their remonstrance was another testimony to the higher claims of Jesus. It is not clear how long this sojourn by the Jordan lasted, but after the arrest and imprisonment of John by Herod Antipas Jesus left Judea, and with his disciples returned to Galilee. Choosing the route through Samaria, he paused to rest at Jacob's Well, and there met a woman of the district, with whom he maintained the remarkable conversation recorded by St. John, and afterwards, in striking contrast with the ordinary feelings of the Jews towards the Samaritans, accepted the hospitality of the neighbouring townspeople for two days. Arrived at Galilee, he paid an early visit to his native city of Nazareth, where the fame of his proceedings had already preceded him. But, as we learn from St. Mark iii. 21, and St. John vii. 5, his own relatives did not believe in him, and the people of Nazareth, who had hitherto known him as a humble member of their own community, were prejudiced against his claim. Entering the synagogue on the Sabbath day he read a portion of the prophecies of Isaiah and claimed their fulfilment in himself. This aroused the contemptuous anger of the Nazarenes, who began to murmur among themselves concerning his humble birth and family connections, the occupation he had hitherto pursued, and to demand some striking miracle in proof of his mission. Jesus reminded them that a prophet was not without honour save in his own country, and that the miracles of Elijah and Elisha had been sometimes displayed for the benefit of strangers, whereupon they were aroused to fury, and justifying their evil reputation they endeavoured, unsuccessfully, to drag him "to the brow of the hill wherewith this city was built, that they might cast him down headlong." Leaving Nazareth Jesus went to Capernaum, and this city became for the remainder of his ministry his chief home and the centre of his labours—so much so that it is referred to as "his own city." From the allusions of the evangelists we learn that it was situated on the shores of the Lake of Galilee; that it was of sufficient size and importance to have its own synagogue;

that the occupation of fishing was pursued there; and further, that it was the seat of a Roman garrison and a station for the receipt of taxes. It was also the home of the brothers James and John, and the residence, though not the native place, of Simon Peter and Andrew. Then one of the cities of a rich and busy country, and possibly one of the stages on the great trade route between Acro and Damascus, it has long since passed away so completely as to render the identification of its site a matter of controversy. It was at Capernaum that Jesus called Simon Peter and Andrew and the two sons of Zebedee from their nets and boats to become "fishers of men," and here he also called the receiver of customs, Matthew or Levi, afterwards apostle and evangelist. The sojourn of Jesus at Capernaum was marked by a great manifestation of miraculous power, and this together with the fame of his preaching caused much excitement throughout the district. Multitudes began to throng into the city to see and hear the new teacher, and its inhabitants became anxious to keep him in their midst. Jesus, however, declined to stay there, and accompanied by his disciples he left the city and entered upon a journey through Galilee, preaching in the synagogues of the different towns, in the homes of the people, and by the wayside, and thus made a general circuit of the country. In this way the remainder of the first year of his ministry was spent, and at its close Jesus went up to Jerusalem to an unnamed feast of the Jews, probably the passover, but possibly the feast of Purim, and here he healed the infirm man at the Pool of Bethesda, and aroused the anger of the Pharisees by bidding the man carry his bed on the Sabbath. His opposition to the minute regulations and observances by which the Sabbath had been made burdensome was further shown by his defence of his disciples when they were charged with plucking the ears of corn on that day, and by his rebuke of the Pharisees at the healing of the man with the withered hand. The order of these events is uncertain, but they serve to illustrate to some extent the attitude Jesus had taken up in his teaching in respect to the ancient Jewish law, and to account for the hostility of the sect of the Pharisees, at that period its most zealous defenders. Returning from Jerusalem to Galilee Jesus was followed there by multitudes of the people, and from among those who had become his disciples he chose twelve to be a distinct body under the name of apostles. Most of them appear to have been Galileans of somewhat humble circumstances, though this is not absolutely certain. Some think that Judas the Iskariot should be read as "the man of Kerioth," in which case he would have been from Judah. Four of the apostles, we know, were independent fishermen of the Lake of Galilee, one had been in the service of Rome as a tax-collector, and one, Simon the Zealot, had been originally of the party of the fierce Judas of Gamala. The appointment of these apostles seems to have been followed by that exposition of the principles of the new kingdom known as the Sermon on the Mount, and by a second circuit of Galilee marked by many similar characteristics to the first. Passing from place to place among the crowded population on the shores of the lake, he was everywhere the centre of curiosity and interest. Multitudes followed him from place to place, or crowded into the villages or towns where he stayed. Some of them, chiefly members of the poorer classes, heard him gladly, and the despised members of the community, classed as publicans and sinners by his enemies, gave a glad welcome to the new prophet whose pity was extended even to them. The representatives of wealth and learning, however, received him with indifference at the best, while more active hostility was quickly manifested by the scribes and Pharisees. In his teaching we find he avoided altogether the pedantic formalism and dependence upon tradition so dear to the rabbis, and drawing his illustrations from the scenes of nature and incidents of common life, he appealed

directly to the hearts and consciences of his hearers. Another feature peculiar to the teaching of Jesus was the parabolic form in which much of it was presented. Over forty of the parables have been preserved by the evangelists, and they intimate that many more were delivered, and that sometimes he taught only in this form. It is true that this method of teaching was previously known to the Jews, and several parables are to be found in the books of the Old Testament; but there is a profound originality in the parables of Jesus, and in depth of meaning and beauty of style they stand far above all other utterances of this kind. Sometimes we find he revealed to the inner circle of his disciples the hidden meaning of the parable, and these interpretations have been preserved, as in the parables of the sower, or the wheat and the tares. In other instances the parable only has been preserved, or there is but a brief indication of its application.

As we have said, the chief seat of the ministry of Jesus at this period was at Capernaum and the neighbouring towns of Bethsaida and Chorazin. In Capernaum Jesus seems to have dwelt with his friends and disciples, and in his journeys to have accepted the readily offered hospitality of his countrymen. That he had no dwelling-place of his own we learn from his comparison of his own position with that of the foxes and the birds of the air. The inner circle of the apostles seem to have had their little possessions in common with each other and with Jesus, Judas being the appointed treasurer and steward. There is also a reference in St. Luke to certain women, one of them the wife of Chuza, a steward of Antipas, who followed Jesus and ministered to their subsistence to his support. While journeying in Galilee Jesus received a visit from two of the disciples of John the Baptist, who from his prison in the fortress of Machærus, on the eastern shore of the Dead Sea, sent to ask the question, "Art thou he that should come, or look we for another?" In answer to this question Jesus bade them carry to John a report of what they had seen and heard, and after their departure he declared to the multitude that in John they had seen the greatest of the prophets and the Elijah who had been promised. It is to this period of the ministry of Jesus that some of the most striking of his miracles belong, including the raising from the dead of the son of the widow of Nain and also the daughter of Jairus, the stilling of the tempest, the walking of Jesus upon the waters of the lake during a storm, and the healing of the demoniac of Gadara. Towards the close of this year we read of a third circuit of Galilee, in which, unlike the previous journeys, the apostles were sent out, two and two together, to visit its cities and villages, avoiding Samaria and the cities of the Gentiles. Jesus also made a journey at this time, but in what direction or in what company we are not informed. About the end of the year the twelve returned, and Jesus went with them to a mountain on the eastern shore of the lake to secure a period of rest; but they were followed by the people, who walked round its shores, and it was for the sustenance of 5000 who had assembled in a desert place that the miracle of the multiplication of the loaves and fishes was wrought. Great enthusiasm was excited among the multitude by this miracle, but it was immediately afterwards that, in consequence of the discourse in which he set forth himself as the bread of life, many of his disciples left him.

The opening of the third and last year of the ministry of Jesus seems to have been marked by an increased amount of hostility on the part of the scribes and Pharisees, some of whom came down from Jerusalem to complain of the neglect on the part of his disciples of the traditions of the elders. In reply to their remonstrance Jesus uttered some terrible denunciations of their formalism and hypocrisy. It seems probable, however, that they contrived to awaken in the people a sentiment unfavourable to Jesus, for we find at this time he left Galilee altogether

and went into the region of Tyre and Sidon, from whence, after a short stay, he passed round by the north of the Lake of Galilee to the region of Decapolis on its eastern side. Met there by his enemies the Pharisees, now joined by the Sadducees, Jesus passed away to the region of Cæsarea Philippi, an altogether heathen district, celebrated for its fortress, its temples, and for its being the source of the Jordan. This marks the most northern point of the journeyings of Jesus, and it was here that Peter, in answer to a question addressed to the twelve, made his memorable declaration in which he recognized Jesus as the Messiah and the Son of God. To this declaration the whole of the twelve seem to have assented, and from this period Jesus began to unfold to them more fully the spiritual nature of his kingdom and his approaching sufferings and death. This event was followed within a few days by the mysterious transfiguration, which took place upon a high mountain the situation of which can only be conjectured. From Cæsarea Philippi Jesus returned to Capernaum, but his mission in Galilee was now drawing to a close. It is not easy to estimate the results of the work of Jesus in his own country. That he had attracted much attention is certain, and it is equally evident that many had in the earlier portion of his ministry professed to become his disciples. But on the other hand none of the rulers had believed on him, many of them had bitterly opposed him, and the great mass of the people, after the first excitement had died away, relapsed into their old habits and ways, and became indifferent to his teaching. Some of his own kinsmen still remained hostile, and the towns where he had chiefly resided finally rejected his ministry. It is to this period we must ascribe the awful denunciations of Chorazin, Bethsaida, and Capernaum which are recorded by St. Matthew and St. Luke.

The feast of tabernacles was now approaching, and Jesus, after refusing to go up to Jerusalem in company with his relatives, went up in secret by the less frequented route through Samaria. On the way he sent out the seventy disciples on a mission to the nation, an event recorded only by St. Luke. Arriving at Jerusalem at the middle of the feast, Jesus found the people of the city much occupied with his mission, and greatly divided respecting his claims. The poor classes were disposed to accept him as a prophet, and seem to have sided with him against the rulers, who, though divided among themselves, yet, whether Pharisees, Sadducees, Herodians, scribes, or priests, were content to unite in an unholy alliance against him. Baffled again and again in their attempts to entrap him into utterances that could be charged against him as seditious, or which would destroy his influence with the people, and roused to fury by the stern and awful rebukes of their cruelty and hypocrisy, they charged him with madness, with being a Samaritan and a demoniac, and more than once threatened and attempted to stone him. His disciples, however, remained faithful, and he also had some friends who were strongly attached to him, and to whose house he could retire, at the village of Bethany, outside Jerusalem.

It is not clear where Jesus passed the period between the feast of tabernacles and the feast of the dedication of the temple, but it is evident that it was not at Jerusalem, and in many harmonies a short visit to Galilee is placed here. Several of the most striking of the parables are connected with this period, notably those of the prodigal son, the rich man and Lazarus, and the good Samaritan; as also the account of Martha and Mary, and perhaps the miracle of the healing of the ten lepers. After the feast of the dedication, which Jesus attended at Jerusalem, he retired from the city to Bethany beyond Jordan. From thence he came back to the house of his friends Martha and Mary, and there he raised their brother Lazarus from the dead. The report of this miracle caused great excite-

ment at Jerusalem, and a meeting of the council was called, at which, on the instigation of the chief priest, it was determined to put Jesus to death as soon as it could be accomplished without exciting popular commotion. He had, however, retired to "a country near to the wilderness, into a city called Ephraim," and from thence he passed into the district of Perea beyond Jordan. As the time of the feast of the passover approached Jesus set out towards Jerusalem, after again solemnly warning his disciples of his approaching sufferings and death. They appear to have been quite unable to realize his meaning, and to have regarded his words as enigmatical, for we find the two brothers James and John endeavouring, through their mother, to bespeak the first places in his coming kingdom, to the great indignation of the remainder of the apostles. On the way up to Jerusalem Jesus passed through Jericho, where he stayed at the house of Zaccheus the publican, and healed the blind beggar Bartimeus. Arrived at Bethany the family of Lazarus made a feast for him and his disciples, and at the feast, Mary, after anointing his feet with precious ointment, wiped them with her hair. This act of adoring love aroused the aversion of Judas, and being reproved by Jesus, he seems to have soon afterwards gone to the rulers and offered in return for a bribe to betray Jesus into their hands. The day after this, Jesus made his triumphal entry into Jerusalem, the circumstances of which are recorded by all the evangelists. The next day was signalized by a second cleansing of the temple and by public teaching in the city itself. When, however, Jesus came on the day following to the temple he was met with an inquiry on the part of the rulers as to his authority for what he was doing—a question which Jesus refused to answer, but asked of them in what light they regarded the work of John the Baptist. This question, which they dared not answer, was followed by the parables of the two sons, of the wicked husbandmen, and of the marriage of the king's son, parables which they perceived were spoken against them, but fearing to arrest him publicly, they left him for the time. The same day, his attention being called by his disciples to the beauty of the temple, he replied by telling them of a time when it should be destroyed, not one stone being left upon another. Connected with this prophecy we find the parables of the ten virgins and of the talents, as also numerous prophecies in relation to the fall of Jerusalem and his own second coming in judgment. The day after this seems to have been spent in retirement with his disciples at Bethany. The following morning the disciples asked where they should make ready the passover, and in accordance with the instructions of Jesus they all assembled on the evening of the day in a large upper room in Jerusalem to eat the preliminary meal taken the day preceding the actual passover supper. At this meal Jesus instituted the sacrament of the Lord's Supper, taught his disciples humility by washing their feet, indicated to them that he was about to be betrayed by one of them, and in answer to a whispered inquiry of John, pointed out Judas as the traitor. From the upper room he departed with his disciples to the shades of Gethsemane, an olive garden outside the walls of Jerusalem. Here Jesus took the three disciples, Peter, James, and John, apart from the rest, and they observed that he began to be sorrowful and sore troubled. After asking them to stay and watch with him Jesus went a little way from them, and they saw him fall on his face and heard him in an agony pray to the Father. Amazed and troubled, the disciples felt the sorrow of Jesus arose from something beyond their power to help—"they wist not what to answer him," and as they waited their eyes became heavy, and when Jesus returned he found them asleep. Twice did Jesus awaken them and then leave them again to pray, using the same words, and then a third time he aroused them and told them the betrayer was at hand. Guiding

a band of men armed with swords and staves and provided with lanterns and torches, Judas entered the garden, and, in the utter abandonment of his treachery, by a kiss and friendly salute pointed out Jesus for arrest. As the awakened disciples hurriedly clustered round Jesus, some of them had asked whether they should resist, and Peter, without waiting to inquire, drew a sword and wounded a servant of the high-priest. Forbidding all resistance, Jesus surrendered himself to the soldiers, whereupon the disciples all forsook him and fled. Two of them, Peter and John, soon recovered themselves, however, and followed the multitude into Jerusalem, drawing nearer and nearer until they joined the crowd at the house of the high-priest.

The soldiers who had arrested Jesus led him first to the house of Annas, who had been high-priest and who still wielded great authority, and who questioned Jesus as to his authority and teaching. These questions Jesus refused to answer, but appealed to the publicity of his teaching, and denied that he had taught anything in secret among his disciples. By order of Annas, Jesus was taken bound over to Caiaphas, who was high-priest that year and who had assembled some of the elders in his house, all of them enemies to Jesus. Their first effort was to establish a capital charge against him by means of false witnesses, but though they found ready volunteers from the assembled crowd, their evidence was so evidently worthless and contradictory that the high-priest at last turned from them and demanded of Jesus whether he claimed to be the Messiah or not. In reply Jesus asserted his Messiahship, and went on to speak of his return with power in the clouds of heaven. This was sufficient; with savage joy the high-priest rent his robe, and charging Jesus with blasphemy was answered by the ready response of the assembled Sadducees, "He is worthy of death." Jesus was then led out into the court of the house, where he was rudely assailed and derided by the soldiers and servants, and where by a look he awakened remorse in the heart of Peter, who had three times denied himself to be a disciple. Early in the morning the Sanhedrim assembled, and Jesus, being brought before it, renewed his claim to be the Messiah, and was formally adjudged to be guilty of blasphemy and liable to the penalty of death. As the Jews had lost the power of inflicting this penalty, Jesus was led by the rulers to Pilate, the Roman procurator, before whom he was charged with sedition. The falsity of the charge was soon evident to the Roman governor, who was also greatly impressed by the quiet unmovable demeanour of Jesus in the presence of his vehement accusers, and he declared, after some private questioning of Jesus in the praetorium, "I find no fault in this man." Then hearing that Jesus was of Galilee he sent him to Herod, who was at that time staying in Jerusalem; but Herod, after finding Jesus impassive both when asked for a sign and when accused by the Jews, sent him back to Pilate, treated with insult and derision, but uncondemned. Pilate, still anxious to save Jesus, and perceiving that his bitterest enemies were the somewhat unpopular Sadducean rulers, now made a direct appeal to the people, and offered to release Jesus in accordance with the custom by which a prisoner was set at liberty every passover. But the chief priests and rulers prevailed with the mob to ask for one Barabbas, who for robbery and murder had been cast into prison. Failing in this attempt, Pilate commanded that Jesus should be scourged, and then brought him out before the people, wearing a crown of thorns and dressed in a purple robe, which had been placed upon him in rude mockery by the soldiers, and appealed to them in the memorable words, "Behold the man!" This appeal was answered by a renewal of the demand for the crucifixion of Jesus, and ultimately Pilate, after washing his hands in the sight of the people in order to signify his disapproval of what they demanded, assented, and Jesus was led away to be

crucified. Since the arrest at Gethsemane the events had passed in such rapid succession, that it was yet morning as Jesus passed through the streets of Jerusalem on the way to Golgotha. In accordance with the custom that usually prevailed, Jesus was laden with his cross, but being unable to bear the weight, the soldiers seized and impressed one Simon of Cyrene for this work, and thus they reached the place of execution before mid-day. There, after Jesus had refused the stupefying draught which it was customary to offer to prisoners before crucifixion, he was stripped of his garments and nailed to the cross, two thieves being crucified at the same time, one on either hand. The solemn incidents of the hours that followed have been recorded in ample detail by the evangelists, and we can attempt no further description. Slowly, and under the gloom of the darkened heavens, the time passed, until about the ninth hour, when Jesus, after commending his spirit into the hands of the Father, bowed his head and died.

Proof of his death was afforded by the rude test of one of the guards, and modern medical science has confidently ascribed its physical cause to the rupture of one of the vessels of the heart. Some of the disciples, notably the women who followed Jesus, had remained faithful to the last, and one of his secret friends, Joseph of Arimathea, obtained his body from Pilate, and assisted by them, and also by Nicodemus, laid it in a new rock tomb outside the city. The entrance to the tomb was closed by a large stone, and afterwards it was sealed by order of the chief priests and Pharisees, and a watch was set over it to prevent the possibility of the disciples removing the body. When, however, the women went again to the tomb to anoint the body of Jesus they found neither guards nor stone, for an angel descending in the night had rolled away the stone, and Jesus, unseen by mortal eye, had arisen from the dead.

The incidents of that day and the days immediately following are somewhat differently recorded by the evangelists, and some difficulty has ever existed in the way of harmonizing their accounts with each other and with that given by St. Paul (1 Cor. xv. 3-6). In all, ten appearances of Jesus are recorded, and of the fact that the apostles and disciples were fully convinced that they saw and spoke with him, there can be no reasonable doubt whatever. The fact of the resurrection of Jesus is inseparably bound up with the whole teaching of the apostles, and from what we know of their character and expectations previous to the death of Jesus, we may feel assured that but for their confidence in his resurrection the system of Christianity would have been for ever buried in the tomb of Joseph of Arimathea. The visits of Jesus to his disciples during the mysterious forty days that followed his resurrection were, as we learn from St. Luke, brought to a close by his leading them as far as Bethany, where "it came to pass, while he blessed them, he was parted from them and carried up into heaven."

The system of religion founded by Jesus has already been referred to in the article CHRISTIANITY, and the doctrine of the church concerning his personality will be given under TRINITY. In this place it is only necessary to observe that the great majority of Christians have ever seen in Jesus the incarnate Son of God, the long-promised Messiah of Israel, and the foreordained Redeemer of the world. From the epistles we learn that during apostolic times other doctrines concerning the personality of Christ had already arisen, and we find from ecclesiastical history that many different estimates of his nature have been formed from the earliest times down to the present day. These have varied from the strange and imperfectly understood notions of the Gnostics, and the high Arian theory once so prevalent which regarded him as the first of created beings, down to that which has been strenuously advocated in modern times, which regards him as only man,

and sets aside all the supernatural in the New Testament as legendary. Of the latter theory the most prominent advocates at the present day have perhaps been Strauss and Renan, though conceptions of Jesus which depart altogether from the teaching of the church have also been presented by Baur, F. W. Newman, Matthew Arnold, the author of "Ecce Homo," and numerous other writers. It is hardly necessary to say that the estimates of Jesus formed by these authors differ very widely from each other, and that the pictures they present vary in many of the most important details. The controversy between the defenders of the orthodox belief and the critics of modern schools who take the other side is one of immense importance and the most profound interest. So far as the orthodox belief is concerned, we may observe that in the incarnation, humiliation, sufferings, and death of Jesus, the theologians of the church have ever seen the highest conceivable manifestation of the love of God towards mankind. The conception of Jesus as the suffering Saviour of men has never ceased to awaken emotions of gentleness and love, or to strengthen men in the struggle against the sin that caused his sorrow; while in his triumph over death, his ascension and exaltation, the church has ever seen the pledge of ultimate victory and the assurance that his kingdom shall finally prevail throughout the earth. Constrained by love to him, myriads of men and women have cheerfully embraced lives of hardship and self-denial, or have faced without flinching shame and reproach, imprisonment and exile, suffering and death. To all his followers life has been ennobled by the thought that Jesus lived a man on the earth, while death, though still shrouded in mystery, has for them lost its terrors, for Jesus is on the further side.

In connection with this it is also a fact worthy of note that even those who would eliminate all save the human from the nature of Jesus have for the most part been touched and moved to admiration by the beauty of his character and the depth and power of his teaching. It would be easy to collect from the writings of men famous for their heterodoxy the most sincere and even impassioned testimonies in admiration of Jesus. The remarks of J. S. Mill concerning Jesus have already been noticed under CHRISTIANITY, and we bring the present article to a close with the testimony of two of the most celebrated opponents of orthodox Christianity—Strauss and Renan—and an extract from Lecky's "History of European Morals."

Strauss in his "Life of Jesus" (people's edition, p. 625) says—"Among the personages to whom mankind is indebted for the perfecting of its moral consciousness Jesus occupies, at any rate, the highest place. He introduced into our ideal of goodness some features in which it was deficient before he appeared. By the religious direction which he impressed upon morality he gave it a higher consecration, and by incarnating goodness in his own person he imparted to it a living warmth. With reference to all that bears upon the love of God and of our neighbour, upon purity of heart, and upon the individual life, nothing can be added to the moral intuition which Jesus Christ has left us."

Renan says—"Jesus gave religion to humanity as Socrates gave it philosophy and Aristotle science. There was philosophy before Socrates and science before Aristotle. Since Socrates and since Aristotle philosophy and science have made immense progress, but all has been built upon the foundation that they laid. In the same way before Jesus religious thought had passed through many revolutions; since Jesus it has made great conquests, but no one has improved and no one will improve upon the essential principle Jesus has created; he has fixed for ever the idea of pure worship. . . . Whatever may be the unexpected phenomena of the future Jesus will not be surpassed. His worship will constantly renew its youth, the story of

his life will cause ceaseless tears, his sufferings will soften the best hearts; all the ages will proclaim that among the sons of men there is none born who is greater than Jesus."

Lecky, in his "History of European Morals" (vol. ii, p. 88), says—"It was reserved for Christianity to present to the world an ideal character, which, through all the changes of eighteen centuries, has filled the hearts of men with an impassioned love, and has shown itself capable of acting in all ages, nations, temperaments, and conditions; has not only been the highest pattern of virtue, but the highest incentive to its practice, and has exerted so deep an influence that it may be truly said that the simple record of three short years of active life has done more to regenerate and to soften mankind than all the disquisitions of philosophers, and than all the exhortations of moralists. This has, indeed, been the well-spring of whatever has been best and purest in the Christian life. Amid all the sins and failings, amid all the priestcraft, the persecution, and fanaticism, which have defaced the church, it has preserved, in the character and example of its Founder, an enduring principle of regeneration."

JESUS, son of Sirach, was a learned Jew of Jerusalem, who employed himself in collecting sayings of wise men, from which, with additions of his own, he formed the book of **ECCLESIASTICUS** (i. 27). We know little of him but what we can gather from that book, which was probably composed about 180 B.C.

JESUS COLLEGE, CAMBRIDGE, was founded in 1496 by John Alcock, bishop of Ely, who had obtained from King Henry VII. a grant of the nunnery of St. Rulegard, then lately suppressed. It has several fellowships, open to natives of England and Wales, without any restriction or appropriation whatsoever. The mastership of this college is in the absolute appointment of the Bishop of Ely. Various scholarships, exhibitions, and smaller foundations, of different annual values, have been bestowed on this college from time to time by different benefactors. The buildings consist of two courts situated in the eastern part of the town. Some very extensive restorations were made in 1873, which had the effect of altering and improving the appearance of the college.

JESUS COLLEGE, OXFORD, owes its foundation to the zeal of Hugh Ap-ric, or Price, a native of Brecknock, who meditated the establishment of a college which should extend the benefits of learning to the natives of Wales. Queen Elizabeth, on his petition, granted a charter of foundation, dated 27th June, 1571, the society to consist of a principal, eight fellows, and eight scholars. Lands were left by the founder, and the income of the college was considerably increased by different benefactors. This was the first Protestant college, and in its statutes the Protestant religion is guarded by several enactments.

JET is a variety of coaly matter resembling canal coal, but harder and blacker; it also takes a higher polish. It is, like ordinary coal, a combination of carbon and hydrogen. Its original source is doubtful, but it appears rather to have been bitumen than woody matter, although woody structure and scales of fish, &c., are sometimes traceable. It occurs in the alum-shales (Lias), near Whitby, in Yorkshire, and is largely employed for the manufacture of ornaments. Much of the jet used in the present day comes from Spain. It has evidently been long used for ornamental purposes, for in a Roman *funerulus* at Whitby a jet earring was found with a female skeleton, and at the church of St. Gerôon, Cologne, a complete suite of jet ornaments was found in a stone coffin. Jet is the *Gagates* of Dioscorides and Pliny; the mineral was formerly found in the river Gaga, in Lycia (Syria).

JET'HOU. See **GILGAMESH**.

JET'TISON, JET'SON, or JET'SAM, goods thrown cutting away of masts or cables or any other part of the overboard to lighten a vessel in distress, including the ship to insure her safety. See also **FLOTSAM**.

In Coke's "Institutes" it is pointed out in quaint Law Latin that jettisoned goods belong to the owners because "those things which during a tempest are thrown out (French *jetés*) to lighten the ship are evidently not thrown overboard with the intention of abandoning them." If such wreckage float it is *flotsam*, if it sink it is *jetsam*, if it is sunk, but tied to a buoy, it is *lagan*. Coke's argument holds good with all three; and they are, therefore, not the lawful spoils of whoever finds them, but must be delivered up to the owners on their paying a reasonable reward for their discovery, which is called **SALVAGE**.

JEVONS, PROFESSOR W. STANLEY, a distinguished writer on logic and political economist, especially remarkable in his consideration of monetary questions, was born in 1835, and received the best part of his education at University College, London. While attending the lectures there he came greatly under the influence of De Morgan, to whom he owed that capacity for handling mathematical conceptions which distinguishes his best work. Receiving an appointment to the Sydney Mint he went out to Australia in 1855. He subsequently returned to England, and in 1862 took the gold medal for philosophy in the M.A. examination at London University. In 1866 he was appointed professor of logic, political economy, and mental philosophy at Owen's College, Manchester. He was appointed to the chair of political economy at University College, London, in 1875. He filled the post of examiner in philosophy at Cambridge (1874-75) and for many years at London, where he had the unique distinction of obtaining the examinership in political economy after serving the customary period as examiner in logic and mental philosophy. He died in 1882.

His contributions to the subjects he studied are of unusual originality and power. His pamphlet on "The Fall in the Price of Gold" (1861) is still, in spite of its mathematical method of handling, the best monograph on the subject; and the most remarkable speculations of Professor Boole owe what popularity they have attained to Professor Jevons' handling. His "Elementary Treatise on Pure Logic" (1864) is probably the best introductory manual to all branches in any language. His "Theory of Political Economy" (1871, enlarged and re-issued 1879) was certainly the most independent and original contribution to the subject since Mill; and his free application of mathematical conception to economics lends it remarkable freshness. His work on "The Coal Question" (1865) was so powerful that it caused of its own force the appointment of a royal commission to investigate the probable future of the coal supply. He showed the necessity of a state parcels post years before it had become a practical question. Everything he touched he made attractive, and possessed an unrivalled power of making even dry subjects amusing, as when in his volume on "Money" (1875) he tells how the different species of currency in which the *prima donna* was paid in Otaheite—pigs, poultry, fruit—were some of them one night eaten up by the others. An attempt at enunciating the principles of reasoning, which he called the "Substitution of Similars," appeared in 1869, and his extended treatise on logic, called "The Principles of Science" (two vols. 8vo), was published in 1874.

In 1884, two years after his death, a very valuable collection of Professor Jevons' smaller articles was made, under the title of "Investigations in Currency and Finance."

JEW, THE WANDERING. The legend of the Jew who, unable to die, is condemned to wander continually on the earth, is of uncertain origin. The earliest written reference to it is found in the Chronicle of Roger of Wendover, which was completed by Matthew Paris, but there it is referred to as being a well-known and familiar tradition. In this account the name of the wanderer is given as Kartaphilus, and he is said to have been door-keeper to Pilate, and as Jesus was led out to be crucified

to have struck him, bidding him to go on faster. Jesus said, "I go, but thou shalt remain waiting till I return." A later version of the story gives the Jew the name of Ahasuerus, and makes him a cobbler of Jerusalem, who when Jesus wished to rest a moment in front of his house, when on the way to Golgotha, struck him and bade him go on, and in consequence was doomed to go on himself until the day of judgment. The legend obtained wide credence during the fifteenth, sixteenth, and seventeenth centuries, and it also received numerous additions and embellishments. Thus he was supposed to pass in storm, so that in some districts when a destructive gale raged the peasantry would say, "The wandering Jew is passing;" while in other places he was supposed to bring with him the plague. During the time the tradition obtained currency many appearances of the wanderer were reported, and indeed many impostors appeared who claimed the title and for a time obtained credence. It is said one of these appeared in England as late as the beginning of the eighteenth century.

The earliest known book on the legend was printed at Leipzig in 1602, but since that date several other versions have appeared. One of these enjoyed such popularity that it was translated into several languages. The story of the wandering Jew has been repeatedly utilized by poets and romance writers. Among authors who have used the legend the names of A. W. von Schlegel, C. F. D. Schubert, Goethe, Edgar Quinet, and Eugène Sue may be mentioned, the romance of the latter being perhaps the most widely known.

JEWELRY. This term comprises the setting of precious stones, and also the manufacture of small ornamental works in gold, silver, mixed metals, amber, coral, and other materials. The use of personal ornaments dates from the earliest periods of which we have any knowledge, and it characterizes every variety of the human race, whether civilized or savage. It is probable that the wearing of gold and silver ornaments immediately followed the discovery of those metals. Probably gold, from the form in which it is usually found and the beauty of its colour, was the first to be used in this way, and also from its ductility and capacity of receiving polish the first to invite artistic skill in its working. Gold ornaments, displaying a high degree of skill in their manufacture, have been recovered from the ruins of Mycenæ and Hissarlik, and from the tombs of ancient Egypt. The gold work of ancient Egypt, though executed nearly 3000 years ago, is of the highest quality, and in many points of excellence it would be impossible to surpass it by the most improved methods of modern times. Many beautiful specimens of the work of the ancient Greek and Roman jewellers are preserved in the museums of Europe, and a large number of very interesting specimens have been obtained from the tombs of Etruria. Some of the gold work displayed in the Etruscan ornaments remained, until a recent period, a complete puzzle to the jewellers of Europe. The method by which the curious granulation of surface was obtained was, however, found to be known to certain gold-workers in the Abruzzi, where the secret had been preserved from a remote period, and through them it has been made known to the modern artificers of Italy. At the present day the Oriental jewellers preserve the same primitive methods of working that prevailed centuries ago. Their great manual dexterity and fine sense of colour and beauty, however, enable them to obtain by simple means some very excellent results, and the work they produce, though unequal in finish to that of European workmen, is generally perfect in design and combination.

In Europe the great centres for the production of jewelry are to be found in the cities of Paris, Vienna, London, and Birmingham. Very elaborate machinery is employed by modern manufacturers, and a great variety of

materials are employed. In Birmingham, which is the chief centre of the cheap jewelry trade, at least 8000 persons are employed in the business, and immense quantities of brooches, earrings, pin-heads, locketts, &c., are turned out every year. The trade of this town also includes much work of the better class, and some of the finest specimens displayed for sale in London are the production of the workshops of Birmingham. In London the districts of Clerkenwell and Pentonville are the chief localities for the manufacture of jewelry, and the work chiefly produced is that of the higher class.

There are great differences in the quality of the gold used by modern jewellers. Old standard gold used to have, and sterling gold still has, twenty-two parts of gold to two of alloy; new standard has eighteen parts of gold to six of alloy. [See HALL MARK.] The so-called fine gold of the jewellers is now usually about 16 carats. The compound which has nine parts of gold to fifteen of alloy is called 9-carat gold, and is allowed to have the sanction of a hall mark. Silver, copper, and zinc are used for alloy, and there are many compositions and many imitations of gold used by modern artificers.

JEWS (Heb. *Yehudin*, children of *Yehudah*, Judah), a term used as synonymous with Hebrews or Israelites, but in a more restricted sense applied to the inhabitants of the kingdom of Judea who were at one time removed to Babylonia, and whose descendants are now scattered over the world. The name Hebrew (Heb. *ibri*) is derived from *abar*, he crossed over, and was applied to Abraham when he had crossed the Euphrates (Gen. xiv. 13). It means therefore "strangers from beyond the river." Israel (Heb. *Yisrael*) means "striver of God," from *sara*, to strive, and *El*, God, and in the Old Testament it is applied (1) to the people generally; (2) to the northern kingdom, excluding Judah; (3) to the exiles who returned from captivity.

From the Book of Genesis we learn that the nation claimed its descent from the patriarch Abraham, one of the descendants of Shem, who migrated from Mesopotamia into the land of Canaan, but whose descendants afterwards settled in the pasture lands of Goshen, in the north-east of Egypt, where they remained for a long time under the protection of the Pharaohs. A pastoral, and therefore a nomadic people, they retained for a time their independence, but afterwards were compelled by the Egyptian government to labour in the construction of some of the immense public works designed by that nation. Such service, which was entirely foreign to their previous free desert life, was very unwillingly rendered, and the Egyptians, who had already suffered from the invasion of a Semitic race, appear to have feared in addition that they would become dangerous enemies. Hence they endeavored to break them into submission by severe treatment, and to reduce their numbers by compulsory infanticide. Ignorant, unarmed, and destitute of a leader, the Israelites were compelled to submit, and had almost made up their minds to serve the Egyptians when a leader appeared in the person of Moses, under whose direction the people gathered together, and with their flocks and herds set out to find a new home on the other side of the desert of Sinai. They found, however, that the land they sought was already in the possession of strong and warlike tribes, and their first attempts to seize a new home involved them in signal disaster, so that they were compelled to turn back to the wilderness, where they remained altogether forty years. Very little is recorded of their life during the greater part of this period, but there seems to have been a central seat of worship and of justice at the Well of Kadesh, while the people generally wandered over an extensive tract of country in search of pasture. Towards the close of this period the people of Israel joined with their kinsmen the Moabites in their resistance against the encroachments of Sihon, king of the Amorites, and conquering him they broke up

his kingdom and took up their abode in his land. They afterwards gained possession of the territories of Og, the king of Bashan, who, with all his people, were utterly destroyed. They had lost their leader Moses in the wilderness, but his place was taken by Joshua, under whose leadership they gradually pushed their way into Southern Palestine, and established themselves in possession of the land. The whole of the early history of the nation is involved in much obscurity, and the details given in the books of the Pentateuch, Joshua, and Judges are the subject of earnest investigation and keen debate among modern scholars. The circumstances of their dependence upon and their oppression by Egypt, of their nomad life in the wilderness, the leadership of Moses and his part in the first establishment of a common *torah* or law, are generally admitted; but around the records of the miraculous events attending the deliverance from Egypt, the journey through the desert, the giving of the law at Mount Sinai, and the date of the social and ecclesiastical legislation contained in the Pentateuch, a controversy has arisen which is yet far from being settled. See PENTATEUCH.

The Book of JOSHUA contains an account of the wars waged with the original inhabitants of the land, and records a series of rapid and on the whole of easy victories over them; but from the Book of JUDGES we learn that the victories were of a very incomplete character, and that for centuries afterwards many of the original inhabitants dwelt side by side with the invaders, retaining their independence, and sometimes becoming predominant. Some of the towns retained their independence until the times of David and Solomon, and many of the Canaanite families or clans allied themselves with the Israelites, and ultimately became amalgamated with them. That there was at this time no proper sense of national unity is evident, for the jealousy and rivalry of the different tribes not only left them an easy prey to their neighbours, but occasionally led to wars and conflicts among themselves. It was only in the presence of some common danger that they became united and remembered that they were the people of Jehovah, but as soon as the danger was removed the old disunion came back again. The men who in the time of oppression or peril came to the front as leaders are termed *judges*—*shophetim*—but they were properly warriors or heroes whose victory in the time of war caused them to be held in honour during the subsequent peace. Of these men thirteen are mentioned—viz. Othniel, Ehud, Shamgar, Barak (with Deborah), Gideon, Abimelech, Tola, Jair, Jephtah, Ibzan, Elon, Abdon, and Samson. Of some of these a rather full account is given, but the others are mentioned with great brevity, and the majority seem to have exercised rule over only a portion of the people, so that they may in some instances have been contemporaries. The two leaders Eli and Samuel occupy a different position to their predecessors, inasmuch as they combined the priestly and judicial office, Samuel being also a prophet. During this period they gave up to a great extent their wandering pastoral life, and entering into the labours of their predecessors they became agriculturists and learned even to trade with their neighbours. Engrossed in the pursuits of peace, they became in their turn the victims of a forward movement upon the part of the Philistines, a warlike nation settled by the sea to the south-west of Judah. In their battles with these people the Israelites were at first grossly defeated, and after the capture of the sacred ark and the destruction of the sanctuary at Shiloh, they appear to have felt that nothing but union under one king could save them from destruction. They chose Saul, the son of Kish, of the tribe of Benjamin, as a ruler, and under his lead they successfully attacked the Ammonites, and drove back the Philistines. More than this, he set up a body-guard of the picked men of the country to serve as the nucleus of an army, and exercised an authority that

enabled him to summon the fighting men of the whole nation whenever it was threatened with invasion. A man of gigantic stature and a bold and resolute warrior, Saul retained his ascendancy over the nation to the end of his life; but he lost the favour of the prophet Samuel, who anointed DAVID, the son of Jesse, of the tribe of Judah, to be his successor in the kingship. Saul, with three of his sons, fell in a battle with the Philistines on Mount Gilboa, and at his death the kingdom was divided, part coming under the dominion of the Philistines, part ruled by Abner, one of the chief warriors of Saul, in the name of Ishbaal, a son of Saul, and the remainder submitting to David, who had previously been in alliance with the Philistines. For a time war raged between the rival houses of Saul and David, but the victory gradually inclined towards the latter, and after the death of Abner, who was killed in a blood-feud by Joab, and the murder of Ishbaal, acts in which David had no part, the elders of Israel united in making him king. The reign of David extended, according to the common chronology, from 1058 to 1018 B.C., and this period was ever remembered with pride by the nation. By the warlike vigour of the king such of the original inhabitants of the land as had remained unsubdued were conquered, while the neighbouring peoples, the Philistines, Moabites, Ammonites, Edonites, and Syrians, were also brought into subjection, until the influence of the kingdom of Israel extended from the Mediterranean to the Euphrates in the north-east, and as far south as the Red Sea. All the men of the nation capable of bearing arms were formed into a militia, and were required in time of peace to submit to a month's training in each year; a body of chosen warriors, principally foreigners, being maintained in constant attendance upon the king. The internal administration of the nation in matters financial, agricultural, and judicial, was also arranged with a completeness that had hitherto been unknown, and the worship of Jehovah was surrounded with a new dignity and splendour. In religious matters David appears to have been guided by the seers Gad and Nathan, and the two priests Abiathar and Zadok, while a chosen band of counsellors, some of whom were renowned for their wisdom, advised in political matters. The closing period of the reign of David was passed in peace so far as external enemies were concerned, but the king's polygamy was the cause of serious internal troubles, and at one period his throne was seriously in danger from the revolt of his own son Absalom. David was succeeded by one of his younger sons Solomon, who was supported by the prophet Nathan, the high-priest Zadok, and David's foreign body-guard, and during his reign the external splendour of the nation was greatly increased. A small but exceedingly costly temple was built in Jerusalem for the worship of Jehovah, and the king also erected a splendid palace for himself. He also planned and carried out many important public works, extended very largely the commerce of the nation, formed alliances with the Egyptians and the Phœnicians, and brought to a high degree of perfection the methods of internal administration commenced by his father. The king, however, did not follow his father in military capacity, and during his reign his dominions received more than one curtailment, while his devotion to the deities of the surrounding countries—Ashtoreth, Chemosh, and Milcom or Molech—alienated from him the prophets and the more devout worshippers of Jehovah. His public works, though magnificent and in many instances useful, involved a large amount of forced labour, while the splendour of his court and harem could only be maintained by heavy exactions from his subjects. One or two attempts at revolt were suppressed during his reign, but at his death the foolish arrogance of his son Rehoboam caused the greater part of the nation to break away from his rule and establish under Jeroboam, the son of Nebat, an independent

kingdom, henceforward known as the kingdom of Israel. The kingdom of Israel was politically the larger and more important of the two, and after the first quarrels incident upon the disruption had subsided, the kingdom of Judah, though occupying a subordinate position, remained upon the whole in friendly alliance with the northern kingdom. The history of the latter extends to a period of about 250 years, during which nineteen kings, belonging to nine different families, occupied the throne. The record of this period, though given for the most part in brief outline, shows that there was a large amount of internal confusion and bloodshed, and prolonged and bitter wars with neighbouring nations. In the conflicts with the Moabites and the Syrians the people were sometimes reduced to great extremities, while at other times they gained victories that recalled the glories of the time of David. Ultimately, however, there came up against Israel a power impossible to resist, in the great kingdom of Assyria, and in the year 721 B.C. Samaria the capital was taken and destroyed, and the greater part of the people were taken away to Assyria, where they disappear altogether from history as a separate people. The kingdom of Judah lasted for a longer period than the northern kingdom, and during the 388 years of its existence it was ruled by twenty kings, all of the dynasty of David. Of these six, Asa, Jehoshaphat, Uzziah, Jotham, Hezekiah, and Josiah, are singled out by the historians for especial praise, both for their good qualities as rulers and their zeal for the worship of Jehovah. Under the reign of Uzziah the influence of the kingdom was greatly extended, but his successor Ahaz, pressed by the united Syrians and Israelites, appealed for aid to Assyria, and henceforward the kingdom of Judah became involved in the conflicts which were waged between the kings of Assyria and Egypt. In these prolonged wars the nation was sometimes in vassalage to Assyria, and at others it came under the influence of Egypt; but its final destruction came from the hands of the King of Babylon, Nebuchadnezzar, who in the year 586 B.C. took Jerusalem by storm, burned both temple and city, and deported the greater part of the people as colonists to Babylon. The chronology of the period of the monarchy is hardly yet fully ascertained, but its duration from the appointment of Saul to the captivity of Zedekiah may be taken as being rather over 500 years.

With respect to the condition of the nation during this period, it is evident that it made considerable progress in civilization. The people took readily to agriculture, and the land being rich and fertile produced abundance of corn, while the vine, the olive, and many fruit-bearing trees were carefully cultivated. They also kept large numbers of cattle and sheep, and in the country east of Jordan and in some parts of the southern kingdom of Judah the pastoral life seems always to have predominated over the agricultural. For commerce, art, and the more important manufactures, they were dependent for a long period upon their Canaanite neighbours; but Solomon engaged in commerce on an extensive scale, and the people gradually learned to become traders themselves. The extensive public works undertaken by the different kings, and the erection of fortified cities throughout the land, prove that there must have been a considerable amount of wealth at some periods, and it is evident from the writings of the prophets, that many of the evils which hitherto have always attended wealth were felt in all their intensity. The soil, which had been originally the inheritance of the tribe, became the private possession of wealthy monopolists, who "added field to field," until the people were shut out from their land (Isa. v. 8). There are also many bitter complaints of oppression and wrong on the part of the noble and ruling classes, who are described as luxurious and sensual, and as guilty of cruel extortion and injustice (Micah iii. 1-4; Amos ii. 6; Zeph. iii. 3, &c.) The administration of

justice does not seem to have been centralized beyond that the king was the judge of last resort, whose decision was final in any controversy. The elders of a city or the heads of families or communities were the judges of first instance, but the carrying out of a decision was generally left to those immediately concerned and interested. That blood-feuds were common, and that wrong was avenged by retaliation, is evident from some of the provisions of the written Torah.

The domestic life of the people seems to have resembled in many respects that which prevails in Syria at the present day, and many of the allusions of the Old Testament receive full illustration in the recorded observations of modern travellers. Polygamy was permitted, and was sometimes practised on an extensive scale by kings and princes, but monogamy, with the right of concubinage, was the general rule. Children were desired and treated with kindness and affection, and the domestic slavery that prevailed was of a mild form, and for the most part was limited to those who were not Israelites of pure descent.

Of the condition of the nation during the period of the Captivity, we have many glimpses in the writings of the prophet Ezekiel and others who flourished at that time. The work of the prophets in the kingdom of Ephraim had not been sufficiently deep to insure a national and religious unity strong enough to resist the disintegrating influences of the exile; but in the southern kingdom their influence was much greater, and it extended over a larger period, and when in their turn the people of Judah were taken away as colonists to Babylon they clung with desperate tenacity to their nationality and religion, and never gave up the hope of a return to Judea.

When, however, the decree of Cyrus (536 B.C.) was issued fifty-two years after the destruction of Jerusalem, permitting the Jews to return to their own land, the majority of those who were comfortably established in Babylonia, many of whom had gained considerable wealth, refused to take advantage of it, and the expedition of 42,360 persons which set out was composed for the most part of the poorer classes. Of these about 30,000 are spoken of as belonging to the tribes of Judah, Benjamin, and Levi, and it is thought that the remainder may possibly represent a remnant of the kingdom of Ephraim which had remained faithful to Jehovah. They found on their arrival in Palestine that much of the land was in the possession of a strange and somewhat hostile population, so that for a long time their position was one of great difficulty and discouragement. It was not until the year 520 B.C. that they commenced to rebuild the temple, and it was not completed until 516 B.C. Their poverty and distress, however, still continued, and they had begun to intermingle with the mixed people of the land, when in the year 458 B.C. Ezra the scribe came with another expedition from Babylon to reinforce the Jewish population. Under his influence, assisted by Nehemiah, who came to Judea in the year 445 B.C., the nation was reorganized and established, the Levitical law was accepted by the people, and the true sons of Israel were separated as far as was possible from the other inhabitants of the land. For about 100 years the people seem to have lived quietly as a province of the Persian Empire, and when that empire was conquered by Alexander Jerusalem submitted without a struggle, and seems to have been favourably treated by him. When he built Alexandria he certainly planted in it a large colony of Jews, who were placed upon an equality with his Grecian subjects. After the death of Alexander the monarchy of Egypt fell to Ptolemy Lagus, who after the capture of Jerusalem, 301 B.C., carried off about 100,000 of the people, whom he settled in the neighbourhood of Alexandria and Cyrene. Here in Egypt the Jews came in contact with the philosophy, science, and art of the Greeks, in all of which they rapidly attained high proficiency. For the use of this colony the Scriptures

were translated into the Greek language, a large number of books were composed in the same tongue, and from the study of the Greek philosophy combined with the peculiar notions of Judaism, the systems of Neo-Platonism and Gnosticism arose and flourished. Palestine remained under Egyptian rule for about 100 years, but after a series of contests it was incorporated, 198 B.C., by Antiochus the Great into the kingdom of the Seleucidae. The Jews readily submitted and were confirmed in the free exercise of their religion, but at a later period, 168 B.C., Antiochus Epiphanes or Epumenes (the Madman) made a desperate effort to destroy everything that was distinctive of Judaism. An altar to Jupiter Capitolinus was set up in the temple, and heathen altars established in every town throughout the nation. The rite of circumcision was prohibited and Sabbath observance forbidden, while all copies of the law that could be found were seized and burnt. Finally every Jew was ordered to eat the flesh of swine that had been offered in sacrifice to a heathen deity, under pain of death. These excesses led to much apostasy, for which the way had also been prepared by the fondness of the ruling classes for everything Greek, but they also aroused heroic resistance upon the part of those who remained faithful. Many of the people endured martyrdom with unshrinking fortitude, and at last Mattathias, a priest eminent for his piety and zeal, took up arms in the defence of Judaism. Seeing a renegade Jew about to offer idolatrous sacrifice in his own town of Modeni, he killed him and the Syrian officer also who presided over the ceremony, and followed this act by collecting round him a faithful band who resolved to fight to the death for the religion of their fathers. At his death his eldest son Judas took command of the army thus raised, and assisted by his four brothers, one of whom, named Simon, was a man of remarkable wisdom, he maintained a successful war with the Syrian generals. On the standard of the army the Hebrew words *Mi Camoka Ictia Yehovah* ("who is like unto thee among the gods, O Jehovah," Exod. xv. 11) were inscribed, and from the initial letters M. C. B. Y. the name Maccabee was derived. After three years' war the city of Jerusalem and the temple were taken from the Syrians, and the Jewish worship was restored 165 B.C., the "feast of the dedication" being maintained ever afterwards in memory of this event. The war was prolonged for several years after this, but in the end an almost independent kingdom was established, which under the rule of the Maccabean princes was considerably enlarged in extent. The people, however, were by no means united among themselves, and their internal history was marked by fierce struggles, attended with much bloodshed, and the discussions of the two parties, the Pharisees and the Sadducees, opened the way for Roman intervention. In the year 63 B.C. Jerusalem was stormed by Pompey, and Judea was made a tributary state of the Roman Empire, though it was still governed by a Maccabean prince. The last ruler of that family was conquered and deposed by Herod (*Herod's*), an Idumean by birth but a Jew by religion, who by the aid of the Romans became master of Jerusalem in the year 37 B.C. He was a strong and capable ruler, and in addition to many important public works he replaced the small temple at Jerusalem with a much more magnificent structure. But he was at the same time tyrannical and cruel, and was cordially hated by the people. The year of his death, 4 B.C., according to the ordinary reckoning, was signalized by an event of greater importance than any that had previously occurred in Jewish history, namely the birth of Jesus Christ. After the death of Herod there were numerous attempts at insurrection, but these were sternly suppressed by the Romans, and ultimately the province which had been ruled over by Herod was divided between his sons—Philip receiving the district of Cæsarea Philippi; Herod Antipas, Galilee and Peraea; and Archelaus, Judæa, Samaria, and Idumæa. The latter was

banished in 6 A.D. by the Romans, and a Roman procurator put in his place, and Judæa remained, with the exception of one interval of four years, under Roman governors until the fall of Jerusalem. Of these governors the most celebrated are Pilate (*Pontius Pilatus*), under whose rule Jesus was put to death; Antonius Felix, mentioned in the Acts of the Apostles, whose conduct contributed largely to increase the internal dissensions of the nation and to encourage the spirit of revolt; and Gessius Florus, whose oppressions and cruelty caused the whole nation to rise in rebellion against the Romans. Few passages of history are more painful to contemplate than those which marked the last years of the Jewish state. Fierce fanaticism, finding vent in desperate party strife, which even when Jerusalem was besieged by the Roman army caused its channels to run red with the blood of its citizens; the pangs of famine, leading to hideous cannibalism; the cruelties inflicted by the infuriated Roman soldiery in the storm and sack of Jerusalem—all combine to make this one of the most awful records of human suffering of which any full account has been preserved. With the fall of Jerusalem and the burning of the temple 70 A.D., and the subsequent fall of Masada 73 A.D., the Jewish state came virtually to an end, and after the suppression of the insurrection led by Bar Cochbas, 132-135, the final dispersion of the Jews took place. See JERUSALEM.

Under Antoninus Pius the condition of the Jews became more happy, and they were allowed to form communities in the different Roman provinces, and to become citizens of the empire. They were allowed to erect synagogues in many places, and they formed an ecclesiastical college or council for the regulation of religious matters, which revived the old title of Sanhedrin. This was presided over by a patriarch, who fixed his seat at Tiberias, and who was recognized by the Roman government as the municipal head of the Palestinian Jews, and permitted to receive offerings from those of other countries. With the rise of Christianity the lot of the Jews became harder, and during the fourth and fifth centuries they suffered much oppression. Many severe laws directed against them were enacted by Constantine, Constantius, Honorius, Theodosius II., and Justinian. After the fifth century, the ecclesiastical centre of Judaism was removed from Palestine to Babylonia, where there had always been an extensive colony from the time of the captivity of Judah, and where celebrated schools for the study of the law flourished for several centuries subsequent to the Christian era. The Jews of Babylon were numerous, industrious, and many of them extremely wealthy, and they enjoyed many privileges in the way of self-government. They placed at their head a leader, who was called *Resh Galutha*, or the "prince of the captivity," and he, though submissive to the state, exercised great authority over his countrymen and lived in almost royal splendour.

After the break-up of the Roman Empire, the Jews were fairly treated in some of the new kingdoms formed, but met with severe persecutions in others. Charlemagne protected the Jews and placed them on a level with his other subjects, and under his rule they filled municipal offices, and were physicians and bankers. Under the Frankish monarchy they were also well treated, and under Louis le Débonnaire they occupied some of the highest positions in the government. In Italy the Jews seem to have enjoyed upon the whole great security; but their safest asylum was Poland, where Casimir the Great allowed them considerable privileges, and where they formed the only middle order between the nobles and the serfs. They found their way to England during Saxon times, and were fairly numerous there at the time of the Conquest. They were favoured by William the Conqueror and his successor William Rufus, and they managed to acquire not only great wealth, but also considerable influence. Their

Increasing wealth and power, however, in the nations of Europe was attended by the growth of a hostile feeling upon the part of the nobles and the populace, while the priests and bishops were their open enemies. The rise of the spirit of enthusiasm which led to the Crusades was very unfavourable to the Jews, and from the eleventh century onwards almost to the eighteenth, their history has been one of oppression and persecution throughout the whole of Europe. In England their troubles began during the reign of Richard the Lion Heart, and the persecution that was commenced on the day of his coronation (1189) grew more and more bitter and cruel, until in 1253 they begged permission to leave the country. They were persuaded to remain, but in 1290 they were driven from the country and all their property was confiscated. The law by which they were banished remained in force for over three centuries, and the Jews were not allowed to return until the time of Cromwell. In France they were expelled during the reign of Philip Augustus, and violent hands were laid upon all their possessions. Allowed to return twenty years later, they were again expelled in the reign of Philip the Fair, and after once more being permitted to re-enter France they became victims to the most demoniacal fury on the part of the people. When the plague of the BLACK DEATH passed over Europe, it was in many places ascribed to the spreading of poison by the Jews, and large multitudes were butchered with circumstances of the greatest barbarity. In France and Germany they were murdered by thousands, and we read of burnings of Jews so extensive as to make some show against even the "acts of faith" in Spain. At Chinon it is said 160 Jews of both sexes were burned in one gigantic pile, and in some provinces every Jewish inhabitant that could be found was burned to death. In 1395 they were again banished from France, and in the state of feeling that then prevailed they found it hard to obtain a refuge anywhere. In Spain the Jews had been at first cruelly oppressed by the Visigoths, and they suffered terribly during the sixth and seventh centuries; but after the Moorish invasion their condition was greatly ameliorated, and for a long period they enjoyed great prosperity. The rise of Mohammedanism had at first brought about an unfavourable change to the Eastern Jews. Mohammed endeavoured at the outset to win them over to Islam, but as they refused to acknowledge his claims he treated them without mercy in his wars in Arabia. Under the caliphs his successors they were protected, on the easy terms of paying tribute; and as they offered no resistance they were protected and encouraged by their new masters, whom they followed through their tide of conquest along the coast of Northern Africa. They contributed materially to the success of the Crescent in Spain, and with the establishment of the Moorish kingdom there began a golden age for the Jews, which lasted for some centuries. Here they not only gained wealth, but they cultivated philosophy, science, and letters, until they stood in the first rank among the learned. After the expulsion of the Moors a terrible change in their position took place, and towards the end of the fourteenth century a series of savage persecutions commenced, which increased in intensity until they reached their climax in 1492, when, under Ferdinand and Isabella, all the Jews in Spain were ordered to become Christians within four months or to leave the country, taking neither gold nor silver with them. Many accepted baptism and became nominally Christian, but the majority resolved to remain faithful to their religion, and accepted the dreadful alternative of exile. It is said that at least 300,000 (some estimates make the number 800,000) were driven out of Spain, and they found nearly every country in Europe shut against them. Some found a refuge in France and Italy, while others crossed over to Morocco. Eighty thousand of them, by payment of a

heavy bribe, found a temporary refuge in Portugal, but in 1495 they were expelled from that country with circumstances of cruelty as great as any that had attended their expulsion from Spain. Those who accepted Christianity were but little better off, for they became the objects of constant suspicion and persecution on the part of the Holy Inquisition. In Holland and Germany they were treated with more leniency, but it was not until the eighteenth century that toleration began to be extended towards them in Europe generally. Slowly and grudgingly the rights of citizenship were allowed to Jews in the principal countries of Europe, the way being led by Austria in 1782 and by France in 1795. In England they obtained the right of naturalization in 1753, and though the Act was repealed owing to popular clamour in 1754, their civil disabilities were gradually extinguished, until in 1858 they obtained what may be termed their final triumph in the admission of Alderman Salomons to Parliament. They are still disqualified for the offices of regent of the kingdom, lord chancellor or lord lieutenant of Ireland, or her Majesty's high commissioner to the General Assembly of the Church of Scotland, but a Jewish judge has already made himself a lasting name in connection with the English bench, and the present generation has seen a member of the same race, though not an adherent to the faith of his fathers, prime minister of the kingdom.

At the present day the Jews enjoy full equality in Great Britain, the British colonies, France, Germany, Italy, Spain, Portugal, Holland, Belgium, and the United States of America, and though the old race hatred against them still occasionally shows itself, as in Germany in 1882-83, it is to be hoped that persecution, so far as civilized countries are concerned, has passed away for ever. That it has not ceased in some parts of Europe is, however, but too evident. In Russia the Jews are confined to a few provinces of the empire, and they are the subjects of many oppressive restrictions. By means of bribery they can obtain some mitigation of the strict letter of the law, but they are largely at the mercy of the official class, which is notoriously given to extortion. In Turkey they are on the whole fairly treated, but in some parts of the East they are oppressed and persecuted. There are also large numbers of Jews in Morocco—it is said as many as 300,000; and though they are not permitted to leave, they are compelled to wear a distinctive dress and are treated with the utmost insolence and rapacity by their Mohammedan rulers.

Of the numbers of the Jews at the present day it is computed that there are in—

Great Britain.	about 62,000
France.	" 60,000
Germany.	" 521,000
Austria-Hungary.	" 1,370,000
Italy.	" 53,000
Holland.	" 68,000
Romania.	" 200,000
Russia.	" 2,612,000
Turkey (in Europe).	" 72,000

These figures give a total of over 5,000,000 for Europe, and it has been estimated that there are about 700,000 in Africa, 200,000 in Asia, 300,000 in America, and over 20,000 in the British colonies, giving a total number of over 6,200,000.

Religion.—The traditional theory, and that which obtained general acceptance until a comparatively recent period, concerning the Jewish religion is that which represents it as a system of monotheism. According to this view Abraham, the founder of the nation, was called from polytheism by means of a special revelation from God, and the people were already monotheists when they went down to Goshen. During their stay in Egypt their primitive faith became corrupted, but it was revived by their leader Moses,

who in the wilderness established the worship of Jehovah as the one and only God. It is admitted that this faith became strangely obscured and corrupted after the settlement in Canaan, and that at some periods of the history it was almost forgotten; but it is held that its memory in the worst times was cherished by a faithful few, and that the reformation effected during the exile was but a return to the original purity. A very different theory, however, has been propounded in more modern times, according to which the Jews were originally a nation of polytheists, and that their worship originally resembled in all its essentials that of the neighbouring peoples of Moab, Ammon, Phœnicia, &c.; that as each nation had its own special deity, so the Jews regarded Jehovah as being their own peculiar defender and Lord; and that it was owing to the work of the later prophets that the conception of a local and national deity was expanded until the nation rose to the conception embodied in monotheism. Eminent names might be quoted in defence of either theory, but the points involved in the controversy are too numerous and elaborate to be mentioned within the necessary limits of the present notice.

Confining ourselves, however, strictly to the declarations of the sacred historians themselves, we find that whatever the original faith of the patriarchs and the founders of the nation may have been, the people as a whole were a nation of polytheists for the greater part of their history from Joshua to the time of the exile. Even before this we learn from the Book of Amos that the people carried a tabernacle in the wilderness for the worship of a strange god, as well as that for the worship of Jehovah mentioned in the other books of the Old Testament, and the incidents of the golden calf made by Aaron and the worship of Baal-peor are recorded at length in the Pentateuch. After the settlement in Canaan the people readily adopted the gods of the land they had entered, and it was only in times of war and trouble that they remembered Jehovah, the God of Israel. That the gods of other nations were regarded as possessing a real existence and exercising power is too plainly and repeatedly expressed to be called in question. The Moabites are the people of Chemosh, as the Israelites are the people of Jehovah (Num. xxi. 29; Judg. xi. 24). Jehovah is praised repeatedly as being more powerful than the gods of other nations, and David, in complaining to Saul of the treatment he has received, speaks of his having been driven out of the inheritance of Jehovah and sent to "serve other gods" (1 Sam. xxvi. 19). When, too, Solomon built temples to other deities in Jerusalem, although he lost the favour of the prophets, the bulk of the people seem to have quietly acquiesced; certainly there is no trace of that fierce zeal against idolatry which flamed out so repeatedly after the return from the exile. The deities chiefly worshipped by the people seem to have been Baal and Ashoreth. [See *ASTARTE*.] Baal was the supreme male divinity of the Canaanites, and Ashoreth the supreme female deity. The worship of these gods was often associated with gross sensuality and licentiousness, as may be learned from the story of Baal-peor in the Book of Numbers and the accusations of the prophets Amos and Hosea; but it retained its place alongside the worship of Jehovah, with but few intervals, from the generation which followed that of Joshua until the time of Manasseh, or about 800 years. There is also mention made of another deity whose worship was practised to a great extent in the kingdom of Judah, and who is generally called Molech, though the names Milcom and Malcham are also used. The earliest allusion to the worship of Molech is found in the history of Solomon, who built a high place for it at or near Jerusalem; but it was maintained afterwards for over 350 years, and the high place was not destroyed until the time of Josiah. Molech was the tutelary deity of the Ammon-

ites, and like Chemosh of the Moabites he was a fire-god, and represented the destructive element of nature. His worship was celebrated with the most inhuman rites, for it was to propitiate the anger of Molech that children were burned alive. Some commentators have denied that human sacrifices were offered to him, but the allusions to the practice are too numerous and too plain to be mistaken. The offering of a human sacrifice in times of dire extremity or to obtain especial benefits was a common practice among Semitic peoples, and we even find traces of a similar practice in connection with the worship of Jehovah. It was to Jehovah that Jephthah made the offering of his daughter; Samuel hewed Agag in pieces "before Jehovah;" and when in the days of David the land was troubled with famine seven of the descendants of Saul were, by the king's orders, hanged "before Jehovah" (2 Sam. xxi. 9).

Not only were the Jews familiar with idolatry, but they also practised several kinds of magic and sorcery. We read of witches and wizards, of diviners and interpreters of dreams, of those who practised enchantments, used incantations, inquired by familiar spirits, and consulted the dead. All such practices are condemned in the Levitical law, but they do not seem ever to have been wholly given up. The use of the mysterious *teraphim* for purposes of divination is mentioned as early as the time of the patriarchs (Gen. xxxi. 34); one of these images was used by Michal to facilitate the escape of David from Saul (1 Sam. xix. 13), and they are referred to by Zechariah, writing after the return from Babylon. The limitation to one central place for the worship of Jehovah cannot be found earlier than the close of the period of the monarchy. Until then the land was filled with local shrines and sacred places, and the people burned incense and offered sacrifices everywhere. See *HIGH PLACES*.

It is plain from the Old Testament history also that it was to the teaching of the prophets that the nation was indebted for the more spiritual conceptions of Jehovah which afterwards prevailed. In the writings which have been preserved we can see how these teachers encountered the gross polytheism of the people with a stern zeal for the sole worship of Jehovah. Not only so, but they endeavoured to supplant the unworthy conceptions of the God of Israel by others of a higher and more lofty order. Against the belief that Jehovah might be appeased or bribed by the multiplication of sacrifices they pointed out that without reformation of life these things were an abomination, and that holiness of life was of more importance than the offering of many gifts. In the place of the old conception of Jehovah as exclusively the God of Israel they taught that his rule extended over other nations, and even throughout the earth, so that the invasions and disasters of the nation were also brought about by him as judgments upon his people for their unrighteousness. Finally, as it became evident that the nation was to be broken up and subdued by the advancing power from the north, they pointed to a time of restoration when from a faithful few the nation should take root again and serve Jehovah in his land.

In the writings of the prophets that have been preserved and in the Book of Psalms we can see abundant evidence of the conflict between the common people and those who sought to spiritualize their faith, and it is plain also that many of the prophets received a full measure of the hatred and hostility that is generally meted out to religious reformers (Acts vii. 51, 52). The period of the exile was marked by a great development in the religious ideas of the nation, and the writings of the prophets exercised a much greater influence over the people, now they were in a strange land, than they had ever exercised when they had been in their own country. They were not wholly unaffected by the religious ideas of their conquerors, and their subsequent beliefs after the return concerning angelic and evil spirits and the im-

mortality of the soul show unmistakable traces of Persian influence; but it was around the worship of Jehovah that their affection chiefly centred. The law of Jehovah and the sacred writings they possessed now assumed a position of great importance; schools were established for their study, and synagogues were set up that the people might meet regularly for the worship of Jehovah by prayer and praise, and to be instructed in his law. After the time of the Maccabees we find the Jews imbued with a stern hatred of idolatry that has never since relaxed, while their reverence for their sacred books increased with their study, until it displayed itself in many instances in strange and fantastic forms. The notes, comments, explanations, and additions which gathered round the written torah were ultimately committed to writing also; and after the destruction of Jerusalem and the dispersion of the nation this work still went on in Palestine and Babylon, the work of the rabbis for several generations being embodied in the Talmud of Babylonia and that of Jerusalem. It must not be supposed, however, that the Jewish mind has been occupied only with the study of the past. While many members of the race have risen to the highest eminence in the study of philosophy, history, mathematics, jurisprudence, philology, &c., there has also been a succession of wise and learned rabbis whose influence in the domain of theology has been very great in the development of religious truth. To indicate even in the briefest outline the movements of Jewish thought since the last exile is impossible within the necessary limits of a work like the present, but from an interesting book written by a Jewish gentleman in defence of his race, entitled "Jews as They Are" (London, 1882), we extract the following concise account of the orthodox Jewish faith at the present day:—

"Jews believe in the Eternal God, One and Indivisible, the Creator and Preserver of the world, the Redeemer and Saviour, and universal father of mankind. They believe in a divine special providence. They believe in the immortality of the soul and in a future state of spiritual existence. They believe in the divinely inspired sacred writings of Moses and the prophets, and of the sweet singer of Israel—David. They believe in the resurrection of the dead. They believe in the divinity and immutability of the laws of God delivered to the Israelites by the hands of Moses, their appointed legislator. They believe that the eternal God is omnipotent, omniscient, and omnipresent; that he is acquainted with man's thoughts and actions. They believe that God rewards those who obey his commandments, and punishes those who transgress them. Finally, they believe that at some future period, which is not within the power and privilege of the finite mind of man to compute, an anointed being of the royal house of David, endowed with transcendental wisdom and power, will appear; and that *then* will be fulfilled the prophecies which relate to that stupendous event.

"With respect to the so-called oral law of the Jews, handed down, it is said, by tradition as supplementary to the written law of God, the Jews of modern times hold various independent opinions, some accepting unreservedly the authority of the ancient learned rabbins on points of scriptural difficulty, others receiving the comments and explanations of those ancient learned doctors as the opinions of fallible men. But in respect to the fundamental principles of Judaism there exists, I apprehend, no difference of opinion whatever." See also HEBREW LANGUAGE AND LITERATURE.

JEW'S HARP, a simple musical instrument, properly the *jaw-harp*, since it is played by being held between the teeth. It may almost be called the "national instrument" of the Hottentots, who tune it by pellets of wax on the vibrator, &c. In fact, its use is very widespread in its various forms. It consists, as we know it, of a rim of metal of a somewhat pear-shaped outline, to which a tongue is riveted,

the free end of the tongue being bent upwards from the plane of the frame in which the tongue lies, so that the forefinger can catch the projection and set it in vibration. The sound thus produced is both reflected and modified in pitch by the changing shape of the cavity of the mouth, and increased or decreased in intensity by the current of the breath. It is usually treated as a mere child's toy, but it is nevertheless capable of producing the most beautiful sounds of a melancholy character. One of the soldiers of Frederick the Great's army made it a solo instrument, and the music-loving king gave him his discharge that he might follow up his talent. He earned a considerable sum. In 1827 and 1828 M. Eulenstein also gained much applause, and money, also by performances on the Jew's harp, using sixteen different instruments with rapid changes, and so getting a compass of no less than four octaves. Prætorius speaks of it as a favourite instrument in 1619.

JEYPORE. See JAIPUR.

JHELUM (*Jhilm*), a river in the Punjab, British India, the most westerly of the five streams from which the province derives its name. It is also known as the Bihet or Bitasta, corruptions of its Sanskrit name *Bitasta*, which Alexander's historians Grecized into Hydaspes, but Ptolemy more correctly as Bidaspes. It rises in Cashmere state, among the mountains forming the north-eastern boundary of the valley, and, after flowing in a south-westerly course, forms a junction with the streams which have their origin in the Pa-Panjal range. It then passes through the picturesque string of lakes in the neighbourhood of Simnagar or Cashmere city, and flows thence forth, above the level of the lower valley, being confined by high banks like those of the Po. Before entering the Wular Lake it receives the waters of a considerable tributary, the Sind, which rises in the northern mountains. The united stream then pours through the snow-clad Pa-Panjal range by the narrow pass of Baranulla, which forms an outlet for the entire basin of the Cashmere valley. At Muzaffarabad, just before entering British territory, the Jhelum receives the Kishn Ganga, a river of equal length, which rises in Baltistan or Little Tibet, and drains an extensive valley among the Northern Himalayas. It next forms the boundary between the Cashmere state and the British district of Hazara and Rawal Pindi, flowing in a narrow rocky channel shut in by mountains on either side. Passing into the district it skirts the outlying spurs of the Salt Range, and finally debouches upon the plains a little above the town of Jhelum, about 250 miles from its source. Below Jhelum inundation of the lowlands begins to be possible. After a south-westerly course of more than 100 miles, during which the river divides the district of Jhelum, from those of Gajerat and Shahpur, it enters the latter district entirely, and trends thenceforth more directly southward. The width in this portion of its course averages 800 yards in flood, dwindling down during the winter months to less than half that size. Sudden frosts occur after heavy rains, and cause frequent inundations over the lowlands, greatly increasing the productive power of the soil. The Jhelum next enters the district of Jhang where it preserves the same general characteristics, but with a wider valley, bounded by the high uplands known as the *Bar*. It finally joins the Chenab (Chandab) at Tarnan, in lat. 31° 11' N., lon. 72° 12' E., 10 miles to the south of Maghiana, after a total course of not less than 150 miles, of which about 200 lie within British territory.

JIB, a triangular sail placed in front of the fore-sail in all vessels, in small ones having the bowsprit for a base, in large ones the jib-boom. The flying-jib, or extra front sail, has the flying jib boom for its base. The jib boom is an extension of the bowsprit, and a flying jib-boom runs out beyond this, thus giving a greater spread for the jib-sails.

JIG (Ital. *giga*, Fr. *gigue*), an old name for a merry lively dance tune and its corresponding dance, either for one dancer or for many. It derives its name from the fiddle, just as the hornpipe does from a little oboe-like pipe. The *jig* or *geige* was a rude sort of fiddle, and the latter name still survives as the common name for fiddle in Germany. In England *jig* has died out except in the form of *jigger*, used for bow or fiddlestick in the west of England. From the jiggling motion of the fiddlestick we get our word to jig, as a fidgety, restless, skipping motion. The dance called jig is now much restricted to Ireland, but it was formerly universal, and a *giga* forms part of all the old suites of dance tunes for the harpsichord which comprised the stock of drawing-room music in Handel's day and Bach's. Both these composers, especially the former, have left fine specimens. In this form the jig was of course classically treated, but retained much of the spirit of the times used for actual dancing. The time is always in threes, either triple, as 1, 2, &c., or duple, as 2, 4, &c.

JINGLES, in "rough music," are loose discs of brass or other metal mounted on a frame. Their highest use is when they are loosely inserted at intervals in the holes piercing the rim of a tambourine, jingling when the instrument is beaten.

JINGO is popularly held to be the corruption of *St. Gengulphus*. The familiar asseveration "by Jingo" is of some comparative antiquity, although it sprang into enormous popularity about 1874, on account of a chauvinist popular song, with the refrain—

"We don't want to fight, but, by Jingo, if we do,
We've got the ships, we've got the men, we've got the money too."

which created a perfect *furor* among the "patriotic" party in the country. Indeed, for some time the party of action were denominated the Jingos by their more peaceful countrymen. But it is, to say the least, doubtful whether Jingo is not the Basque word *jainko* (God), and it would certainly seem more consistent with the habits in swearing of our ancestors that "by Jingo" should bear this origin. The English connection with Biscay was of some duration under the Angevins, and was especially close under the early Edwards. Thus Edward I. had Basques serving under him when he conquered Wales in 1272. The Basque provinces were not finally lost till Henry VI.'s time, and had come to us with Henry II.

JOACHIM, ABBOT OF FLORA, in the kingdom of Naples, to whom was (probably in error) universally attributed the "Everlasting Gospel" which formed so remarkable a centre for the great revival of the Fraticelli or Spiritualists among the powerful order of Franciscans, was born in 1115, and died in 1202, or according to another account ("Biographie Universelle"), was born in 1130 and died in 1207. The "Everlasting Gospel" was condemned by the Council of the Lateran in 1215, and the Council of Arles in 1260; yet Honorius III. avouched the orthodoxy of Joachim, and in the *Acta Sanctorum* (for Joachim is a saint of the Roman calendar) his ascetic life, preachings, and miracles are honourably set forth. This curious book, the authorship of which yet remains a mystery, was alleged to be of Christianity what Christianity had been to Judaism. It taught three estates of man, three revelations of God. Judaism was of the Father, Christianity of the Son, and the coming faith would be that of the Holy Ghost; the Dominicans and the Franciscans were the Baptists or heralds of this new gospel of poverty and religious equality. But as the Old Testament had shone with the brightness of the stars, and the New with the brightness of the moon, so did the "Everlasting Gospel" shine with that of the sun, so said its believers. Excommunication was pronounced on all who possessed this book, but its visions were only held

the more authentic. The orthodox Franciscans, now rapidly growing wealthy, repudiated the whole book and sought to fasten it on the Dominicans; but these latter were far more successful in linking it to the teachings of the austere Fraticelli, or revivalists of the original Franciscan simplicity. The teaching of the "Everlasting Gospel," that the great sign of the coming kingdom of the Holy Ghost was the corruption of the papacy, was akin to the unwearied exhortations of the Fraticelli on this subject. Eventually it was skilfully managed to disconnect Joachim with the book sought to be fathered upon him, and he was canonized. It was long before the intense fervour aroused by the supposed teachings of the abbot died away.

JOAN, POPE, the alleged female pope, who is said to have reigned from 853 to 855, between Leo IV. and Benedict III. In the great list of the popes of the Jesuit compilers of councils, Labbeus and Cossart, a list professedly constructed by reconciling the two most authoritative documents on the subject (the "Corpus Juris Canonici" and the "Annals" of Baronius), and which is the list now usually agreed to by Catholic historians, there occurs this mysterious note after the entry of Leo IV.: "Here is impudently inserted by some the female pope, Joan." Spanheim ("Exercitatio de Papâ Feminâ," Leyden, 1703) has collected the authorities for the widespread belief. They are incredibly numerous. The following are a select few, chosen because of their great importance in the church, who have related the circumstance of Pope Joan's reign as a fact:—Anastasius, librarian of Pope Leo IX.; the learned theologian Marianns Scotus; the annalist Siegbert; the Dominican Bishop Otto; Martinus Polonius, grand penitentiary to Popes John XXI. and Nicholas III.; Bernard Guy, inquisitor under Pope John XXII.; Almaric d'Auger, author of a list of the bishops of Rome, dedicated to and received with favour by Pope Urban V.; the secretary of John XXIII., Theodore Nien; and the very learned and pious French chancellor Gerson, the soul of the great councils of Pisa and Constance. The careful Platina, the librarian of the Vatican, numbers this mythical woman as Pope John VIII. in his "Lives of the Popes" (Rome, 1479), apologizing for feeling bound to relate the circumstances of her reign, "lest," he says, "it should seem as if he had left out from overmuch obstinacy and perversity what practically every one believed" (Ne obstinate nimium et pertinaciter omisisse videar quod fere omnes affirmant). So also Mosheim, the erudite chancellor of Göttingen University, in his "Ecclesiastical History" (Göttingen, 1726). The learned and pious Dr. Döllinger, however, leader of the "Old Catholic" movement in Roman Catholic Germany, has in our days examined this vexed question thoroughly, and he pronounces it to be a myth—a myth invented by Romanists long before the Reformation, but still a myth. He says in his "Fables respecting the Popes of the Middle Ages" (translated by Plummer, London, 1871) that it clearly originated in Rome, "not with the Waldensian heretics, as has been alleged, but with their deadly enemies, the Dominicans and Minorites. In the fifteenth century hardly any doubt of Joan exists. Quite at the beginning of the century the bust of Pope Joan was placed in the Cathedral of Siena in its place among the series of busts of the popes, and no one took offence at it. The church of Siena, in the time that followed, gave three popes to the Roman see—Pius II., Pius III., and Marcellus II. Not one of them ever thought of having that bust removed. It was not till two centuries later that, at the demand of Pope Clement VIII., Joan was metamorphosed into Pope Zacharias." David Blondel, a Protestant, had already refuted the story in his "Familiier Eclaircissement de la Question si une Femme a été assise au Siège Papal entre Leon IV. et Benoit III." (Amsterdam, 1649).

The earliest detailed mention of Joan is in the "De

Scriptoribus Ecclesiæ" of Trithemius, who wrote A.D. 900, closely after the time of the alleged occurrence, but copies the narrative of an alleged contemporary of Joan's, a monk named Rudolph. This legend was told by frivolous Italian writers as a "good story," until it became so widespread as to receive universal credence among the gravest persons. The alleged documentary evidence is believed by Dr. Döllinger to have been concocted by tampering with genuine writings. The best book on the whole subject is Emmanuel Rhoides' work on "*La l'apresse Jeanne*" (Paris, 1878).

JOAN OF ARC. See **ARC**, **JOAN OF**.

JOB, THE BOOK OF, one of the canonical writings of the Old Testament, and the grandest specimen of Hebrew poetry extant. In its present form it consists of five parts: the introduction, the discussion between the hero Job and his three friends, the contribution of Elihu, the address of the Almighty, and the epilogue. In the introduction or prologue, which is in prose, a picture is presented of an Oriental chieftain of great wealth and power and of perfect integrity, whose character becomes the subject of controversy between Jehovah and the accusing angel Satan. The latter having received permission to test Job deprives him of all his wealth and of his children in one day, and afterwards afflicts him with a painful and loathsome disease; but Job remains faithful, and notwithstanding the despairing suggestion of his wife, still retains his confidence in God. Then three friends are introduced who have made an appointment together to mourn with Job and to comfort him, and the second section of the book, now changing from prose to poetry, begins. This portion consists of three discussions on the nature of God's dealings with man, in the first two of which each of the friends speaks in turn, and is answered by Job; in the last, two of the friends only continue the debate, and Job, after replying to the second, draws a vivid picture, contrasting his former prosperity and present misery, and defends himself against the charges laid against him. Starting from a fundamental conception of the justice of God, the three friends have concluded that evil can only come upon man as a punishment for his sin and as a warning to repent, hence they at first urge Job to penitence and amendment; and when he maintains his integrity, to support their position they openly charge him with iniquity. Once Job thought as they did, but now he sees there is a greater mystery in the dispensations of Providence than he had imagined, and though he cannot understand this mystery, he has learned that the simple theory of retributive justice is insufficient to account for it. In the third division we have the address of Elihu, a bystander and a young man, who, dissatisfied with the result of the controversy so far as it has gone, speaks both to Job and his three friends, and endeavours to vindicate the justice and goodness of God. He is angry with Job because he persists in maintaining his righteousness before God, and is angry with the friends because they have found no sufficient answer, and he dwells at some length upon the certainty of there being justice, love, and wisdom with the Author of creation. The closing words of Elihu are spoken amidst the signs of an approaching storm, and from his chariot of the whirlwind God is heard speaking to Job. In the address of the Almighty no answer is given to the problem of evil either as it affects the world in general or the particular case of the patriarch, but by a series of questions concerning the wonder and mystery of the universe, and the weakness and insufficiency of man either to understand or control its forces, Job is led to see that patient trustful submission is the only spiritual attitude open to a righteous man. The epilogue gives an account of the final restoration of Job to a state of prosperity greater than his first position had been, and his death at a great age brings the narrative to a close.

The author of this book, and the date and place of its composition, are altogether unknown. Concerning the authorship, there is no known writer of any other portion of the Old Testament to whom the book can be reasonably ascribed, and in the presence of the many conflicting opinions of ancient and modern scholars, it must be regarded as a problem wholly insoluble. A Jewish tradition which ascribes the book to Moses, and the absence of any reference to either the history or law of Israel, have led some scholars in former times to assign the composition of the book to the patriarchal age, but this theory has been wholly abandoned by modern Biblical critics. The language, style, references, and the tone of thought sustained in the book point inevitably to a much later period. By many scholars the book is regarded as belonging to the age of Solomon, and it is considered to be a result of that short contact between the religion and culture of the Hebrew and the Arabian branches of the Semite family which took place during his reign. Others, having regard chiefly to the high spiritual tone of the poem, place it somewhere about the sixth century B.C. In the prologue the writer uses the name Jehovah in speaking of God, the patriarchal names of El and Shaddai being generally put into the mouths of the speakers. The language of the book has several grammatical and other peculiarities, and it abounds in Syriac and Aramaic expressions. With regard to the integrity of the book, there are several portions which are by many eminent scholars regarded as interpolations by later hands, the chief of these being the speeches of Elihu, the magnificent hymn in praise of wisdom given in chap. xxviii., and the descriptions of the Leviathan and behemoth, chap. xl. 15 to xli. The beauty and value of these portions are not questioned, but they are regarded as contributions to the subject of the book on the part of other poets which have been incorporated with the original. Concerning the nature of the book there have been many different opinions. In the Talmud Rabbi Samuel Bar Nachman is cited as declaring his opinion that "Job did not exist, and was not a created man, but the work is a parable," and this opinion has found many supporters. The theory, however, most generally received among modern scholars, is that which regards the book as an imaginative dramatic poem, founded upon a much earlier historical tradition.

Lastly, in reference to the design of the book, beyond the manifest facts that it deals with the problem of evil, the dealings of God in providence, and inculcates lessons of reverent submission to the divine will, there is but little agreement among commentators. Probably, like certain other of the greatest works of literature, it rises above the minds of those who seek to explain it, though its force, depth, and beauty are manifest to all. Carlyle's opinion of this book, though often repeated, may be fittingly quoted here:—"I call it, apart from all theories about it, one of the grandest things ever written with pen. One feels, indeed, as if it were not Hebrew; such a noble universality, different from noble patriotism or sectarianism, reigns in it. A noble book; all men's book! It is our first, oldest statement of the never-ending problem—man's destiny, and God's ways with him here in this earth. Sublime sorrow, sublime reconciliation; oldest choral melody, as of the heart of mankind, as the world with its seas and stars! There is nothing written, I think, in the Bible or out of it of equal literary merit." For works bearing upon the criticism and design of this book, the writings of Ewald, Delitzsch, Renan, Kuenen, Schottman, Hirzel, Cheyne, Davidson, and Plumptre may be consulted.

JOBBER, a dealer in stocks and shares in companies, or in government funds or securities; or a person who does chance work as distinguished from a regularly employed workman.

The word *job* used to be spelt also *gob*, and no doubt

comes from the old French *gobet*, a mouthful; hence a job was a mouthful of work, not a full meal—a small spell of work, that is. A jobber is one who hangs about in the chance of doing such small jobs—commissions in money matters as well as other kinds of work. But the word tends to become limited to stockjobbers, who are the actual dealers in stocks. Stockbrokers are the persons who buy as brokers for the general public from the stockjobbers. The latter hold, or profess to hold, the stocks or bonds sold. A jobber is bound to make a price, and thus he does by naming two figures to the broker. Say he quotes $86\frac{1}{2}$ to $\frac{3}{4}$ for a certain stock; this means that he will buy at $86\frac{1}{2}$ and sell at $86\frac{3}{4}$, and this he is bound to say without knowing whether he is to be asked to buy or sell. The difference between the two prices is the turn of the market. It is felt by every one that in this way neither are stocks brought into the market to be sold run down unfairly, nor are those desired to be bought improperly advanced in price. Also an immediate market at some price or other is always at hand for stocks and shares of all kinds, which is a great public convenience.

If during the day a certain stock is largely bought, the jobber will raise the price of it, or else he will, after exhausting his own stock, be unable to get more to fulfil his bargain at the lower price; if, on the other hand, every one is selling to the jobber, he lowers his price lest he should accumulate more than he can afterwards dispose of.

JOB'S TEARS is the name given to a grass, *Coix lacryma*, on account of the drop-like form of the whitish, shining fruits. It is a native of the East Indies, and has become naturalized in all the warmer parts of the globe. When other grain is scarce it is used to make bread; and not seldomly it is often employed for its strengthening and emetic qualities. Bracelets and other ornaments are made by stringing the seeds. This grass is often found in cultivation in gardens, as it is a handsome plant, growing well in light rich soil. It was introduced into England in 1596.

The stony covering of the fruit consists of the sheath of a subtending bract, which also incloses the withered glumes and the internode of the rachis. The spicules are unisexual, the male flowers being at the upper nodes, each with three stamens, while there are one or two female spikes at each of the inferior nodes.

JOCAS TA or **JOKAS TA**. See **IOKASTR**.

JOCELIN DE BRAKELOND, a chronicler of the abbey of St. Edmund's, Bury, whose lively narrative, especially of a certain brave Abbot Samson, was published by the Camden Society in 1840, and gives a vivid picture of life and manners at the close of the twelfth century. But its greatest fame was gained by its serving as text to a very remarkable book of Thomas Carlyle's called "Past and Present" (1843)—Jocekin serving for the past, and a series of vehemently denunciatory essays of our latter-day sins for the present. Most people delight in the first part of this book as much as in any work of the prophet of Chelsea.

JODEL or **JODL** is a peculiar style of singing in long shapes, passing from chest notes to high falsetto tones, used by the Swiss and Tyrolese among the mountains as calls to their flocks or to one another. A jodel can be heard for an immense distance in the rarefied air of the high Alps. Songs are fitted with jodeln as choruses, and form a very characteristic class of music peculiar to those mountain districts.

JOEL (Heb., "Jehovah is God"), a prophet of Judah, one of the twelve minor prophets, was the son of Pethuel, or, if the Septuagint version is followed, of Bethuel. Nothing whatever is known of his personal history, though there is a tradition that he was of the tribe of Reuben, and that he was born and buried at Bethoron, between Jerusalem and Casarea. Similar obscurity exists as to the date of his prophecy, and it has been assigned by different commen-

tators to the times of Josiah, Hezekiah, Manasseh, Josiah, Uzziah, and the post-exilic period, the latter period being perhaps that most generally adopted by modern critics. The book of the prophet opens with a description of impending judgments in the shape of a visitation of locusts and a time of drought, and he exhorts his countrymen to turn to Jehovah in penitence and prayer that the plague may be averted from the land. In return for this he promises that the land shall be delivered from its disasters, that a time of abundant increase shall be given; and then, speaking in the name of Jehovah, he promises yet higher and greater blessings that shall be given in the coming day of Jehovah, when the enemies of his people shall be destroyed and Judah shall be established in peace and prosperity for ever.

The book is written in a style of great purity and elegance, though it contains several words peculiar to itself, and in the sublimity of its poetic imagery it rises equal to any portion of the prophetic writings, with the exception perhaps of Isaiah. By many commentators the locusts described with such vivid imagery in the second chapter are regarded as representing the ravages of a hostile army; but others strongly contend for a literal interpretation. The concluding prophecies are generally regarded as referring to the time of the Messiah, and one of them is applied by the apostle Peter, in the Acts of the Apostles, to the outpouring of the Holy Spirit on the day of Pentecost.

JOGUE or **YOG** is the Hindu term corresponding to our "era."

The *suttee jogue* (age of purity) lasted 3,200,000 years, the life of man being 100,000 years on the average, and his stature 21 cubits.

The *tirtar jogue*, when a third of the human race was corrupt, lasted 2,100,000 years, the life of man now averaging only 10,000 years.

The *decapaur jogue* saw the depravation of half mankind. It lasted 1,600,000 years, and men were limited to 1000 years.

The *collee jogue* is the corrupt age which we live in. It will last but 400,000 years, and 5000 are already flown. In it no man may live beyond 100 years, and few there are who may attain therunto. (See Hallied, "Gentoo Laws," 1781.)

JOHN, KING OF ENGLAND (surnamed *Sansterre*, or "Lackland," because he held no fief from his father, as did all his brothers), was the youngest son of Henry II., and was born at Oxford, 24th December, 1166. In 1177 his father conferred upon the boy-prince the dignity of Lord of Ireland; and in 1185 John went to take the government into his own hands accompanied by Rufus de Glanville and Gerald Barry, better known as Giraldus Cambrensis; but the insolent demeanour of the prince and his attendants so disgusted the Irish, that his father found it necessary to recall him in the following December. However, under his brother Richard, John was left to "manage" Ireland at his own bad will.

No opposition was offered by John to the accession of Richard, notwithstanding his own ambitious expectations; but when the intelligence of his brother's captivity in Germany arrived in 1193, John at once openly took steps for the usurpation of the throne. In this attempt, however, he was successfully resisted; and on the return of Richard to England, in March, 1194, John's castles and estates were seized by the crown, and he fled to Normandy, whither he was followed by the king at the head of an army; but the traitor made his peace by an abject submission. It is said that Richard, when on his deathbed, was induced to declare John his successor.

John was present when Richard expired at Chaluze, 6th April, 1199, and before visiting England he hastened to secure the submission of the various continental territories of the crown. Meanwhile in England, by the activity of the

justiciary Fitz-Peter, a unanimous resolution to receive him as king had been obtained from a great council held at Northampton. Soon after this John made his appearance in person; and he was crowned at Westminster, on the 26th of May, the festival of the Ascension.

Philip Augustus of France having, for his own purposes, espoused the cause of Arthur (the son of Richard's elder brother Geoffrey, and in modern view the true heir to the throne), whom he had got into his possession, soon overran both Normandy and Anjou; but in May, 1200, John purchased a peace. Nevertheless in 1201 Philip took arms again, and rapidly obtained possession of all the most important towns and places of strength in John's French possessions. Arthur, however, was taken captive by his uncle (1st August, 1202), immediately consigned to close custody in the Castle of Falaise, whence he was removed to Rouen, and was universally believed to have been there put out of existence by his uncle's order. John's cruelty was too gross even for the men of that rough time; no one would willingly have such a king, and before the end of the year 1204, Normandy, Anjou, Maine, and Touraine slipped without effort from the crown of England, and were re-annexed to that of France. Two years afterwards John made an unsuccessful attempt to recover what he had thus lost. John had married the daughter of the Earl of Gloucester, but in 1201 he procured a divorce on the plea of consanguinity, and married Isabella, daughter of Aymar, count of Angoulême.

While still at war with France, John became involved in another contest at home. By insisting upon the right of the crown to nominate the Archbishop of Canterbury, he drew upon himself the hostility of the whole body of the national clergy, and also of the Pope, INNOCENT III., at whose instigation Philip Augustus prepared to invade England. John was now in a terrible position. Clever, learned, industrious, ambitious beyond all his house, he was also beyond them in the lust, the pride, the savagery which disgraced them. He won men's and women's hearts by his outward manner, only to break them when his true self was revealed. His treachery broke the heart of his father, his perfidy shamed his brother, by his cruelty his nephew was undone. No woman's honour and no man's liberty were safe at the court of John. One by one men found out the terrible tiger-like nature of this inhuman being, outwardly so handsome and winning when he chose, but so black at heart; and one by one they had deserted him. He, the cleverest statesman in Europe, was powerless at his need; because his subjects hated him and he stood alone, except so far as he could compel a reluctant assistance. In 1208, John still refusing to accept Innocent's nomination of Stephen Langton as archbishop of Canterbury, the Pope put all England under an interdict. All worship, except in a few privileged monasteries, ceased utterly, all sacraments except baptism were refused—the very dead lay unburied. This usurpation by Rome tended to draw men towards the king, who was quick to meet the national spirit of independence and turn it to his own ends. He confiscated the lands of the clergy; some of them he even crushed to death under ropes of lead, in horrid mockery of their priestly garments. Men turned sick at such things and broke away from him on all sides. Ireland, urged by emissaries of the Pope, flamed into open revolt in 1210. John, a tactician far in advance of his age, passed into Ireland at once with a few chosen troops, and in sixty days cleared all the "English" part of Ireland—the pale, so called. He created twelve counties, strongly fortified the march or Irish frontier, and his great castle at Limerick stands to this day among others.

But while he was thus beginning a conquest by which he hoped to reconquer himself for the loss of Normandy, John was allowing disaffection to grow rampant in England. When the Pope's messenger, Pandulf, arrived to proclaim

his deposition by Innocent's decree, as an excommunicated man could no longer be suffered to reign, John saw round him only faces of men whom he had robbed, and the honour of whose wives and daughters he had sullied. For the moment he was helpless. There was no move to play save one. He stayed the actually advancing armament of Philip by receiving Langton as primate, and by making the most humiliating submission to the Pope, to whom he surrendered his kingdom and paid homage and tribute. Philip, mortified by this pacification, would have persisted in his project of invasion but for the result of a battle fought in June, 1213, between the English and French fleets, in the harbour of Damme, the first great victory in the naval annals of England, in which 300 of his vessels were captured, about 100 burned, and all Philip's military stores and provisions taken or destroyed. John's deeply laid scheme now came to light. His nephew Otto advanced from Germany, and he crossed into the south of France from England. Poitou was steadily reconquered and covered under John's savage revenge for its submission to France so easily. Philip, successfully attacked both on north and south, seemed on the point of yielding. But every nerve was strained on the part of the French, and Otto was met by so determined an onslaught at Bouvines (1214) that his mixed army of Germans, Flemish, and English was scattered to the four winds. Poitou rose against the invader with joy at the news, and John was glad enough to escape by the most hurried flight from the ancestral possessions he had only just won back. Once more the game was up. On the 19th October, 1214, a truce was arranged between the two kingdoms, to last for five years. But the depressed state of John's affairs now presented to his barons an opportunity for the renewal of demands which they had repeatedly made in vain. Langton laid before them the charter of Henry I., and they determined to unite to obtain not only that, but a much more stringent limitation of the power of the crown. The result was the celebrated meeting in the meadow of Runnymede near Windsor, on Trinity Monday, 9th June, 1215, and the concession and signature of the Great Charter (*SE MAGNA CARTA*). This was followed by fresh encounters with the barons, caused by John's endeavours to escape from the obligations of the charter, which the Pope annulled at his request, excommunicating the barons, and laying London under an interdict. John contrived to trade not only over the seas, but also to detach the King of Scotland, who had taken the opportunity to invade the kingdom. The barons, as a last resource, invited Louis the dauphin of France to accept the crown. Louis set sail from Orléans with a fleet of six hundred and eighty sail, and on 30th May, 1216, landed at Sandwich, attacked, and reduced the Castle of Rochester, and immediately after occupied London. The contest which followed seemed of doubtful issue; but on 14th October, as John was attempting to ford the Wash at low water, from Crosskeys to the Fossdyke, and had already got across himself with the greater part of his army, the return of the tide suddenly swept away the carriages and horses that conveyed all his baggage and treasures; on which, in a agony of vexation, he proceeded to the Cistercian convent of Swinhead, and was that same night seized with a violent fever. Others attributed his illness to poison. He was conveyed the next day in a litter to the Castle of Sleaford, and thence to the Castle of Newark, where he expired, 18th October, in the forty-ninth year of his age and the seventeenth of his reign. At his death, said the chronicler, in words of fire, painting well the general hatred and contempt, "Hell itself is defiled by the fouler presence of John." The barons, glad to be rid of the necessity for the foreign invasion, at once proclaimed the young Prince Henry as king. [See HENRY III.] Louis, sorely angry at his useless expedition, had nothing for it but to return to France.

JOHN has been the pontifical name of no less than twenty-three popes, but very few of these are of great importance in the history of the papacy. In many cases a simple enumeration is all that is here necessary.

JOHN I., a saint, reigned from 523 to 526. He was a Florentine, but his family name is not preserved. The Arian ruler of Italy, Theodoric the Goth, forced John to appeal to Constantinople for toleration towards Arianism, and because the Pope failed in his mission he was thrown into prison and died there. Consequently he is regarded as a saint and martyr by the orthodox church.

JOHN II. (*Mercurius*) reigned from 532 to 535; **JOHN III.** (saint, a Roman named *Callistus*), from 560 to 573; **JOHN IV.**, a Dalmatian, from 640 to 642; **JOHN V.**, a Syrian, from 686 to 687; **JOHN VI.**, a Greek, from 701 to 705; **JOHN VII.**, also a Greek, from 705 to 707.

JOHN VIII., a Roman, reigned from 872 to 882. He was a man of consummate diplomatic gifts, but unscrupulous in diplomacy, and loving a tortuous policy. Yet he failed utterly in his object, which was to make the see of Rome supreme over Italy, and to assert the dependence of the empire upon the papacy. The latter object caused him to offer to crown Charles the Bald as emperor, but in the event it was not Charles' sons, but their cousin and enemy, Carloman, who entered Italy and demanded coronation. The former object caused him to pay annual tribute to the Saracens, whose continued attacks disturbed his Italian policy by causing every energy to be spent in defence and giving no time for diplomacy. With all his high aims John was held prisoner in Rome by Carloman's forces in 878, and with difficulty escaped to France without crowning him. Here Charles the Fat received him well (in return for which he later on crowned him emperor in 881), and at the Council of Troyes the Pope, at a safe distance, excommunicated all his enemies, including Formosus, bishop of Porto, who was afterwards pope, and whose popedom caused so much disturbance. In 879 John returned to Italy and vainly recommenced his plan for Italian unity. To get Greek help he even consented to restore the heretic Photius to the patriarchate of Constantinople, a man who had dared to pronounce Constantinople ecclesiastically the equal or the superior of Rome; but as the help was not forthcoming he withdrew his concession. (Cardinal Baronius, condemning this fatal and feminine weakness, as he calls it, says that no doubt this gave rise to the fable of one of the popes John being a woman, Joan or Johanna; and Platina, the librarian of the Vatican, says John VIII. was a woman [see *JOAN, POPE*], but he does not mean that the subject of this article was a woman.) All these schemes failed, and John's humiliation at the unworthy means he had employed in vain broke down his strength, once so unusually great, and he became miserably weak. The last act of this (according to Baronius) femininely gentle pope was to plot a general massacre of the Saracens with the Duke-bishop of Naples. His excommunications, always frequent, grew more numerous and violent. Some say, it is said, beat out his brains with a mallet, and Formosus, afterwards pope, was charged as an accomplice and actually excommunicated. But the first act of the new Pope, Marinus, was to declare Formosus innocent.

JOHN IX., who reigned from 898 to 901, terminated the controversy over Formosus, who, after being in life first held in veneration as the apostle of the Bulgarians, then condemned as a murderer, and then elected pope, was in death torn from his grave to be insulted in every way, and yet at last to be restored to the tomb and to the honour of all men by John IX., who caused him to be canonized. For this and other causes he held the Councils of Rome and Ravenna, both in 898.

JOHN X. was a young ecclesiastic, the paramour, some say the unwilling paramour, of the infamous Theodora, who forced Pope Sergius, whom she ruled at this time, to

prefer him to the archbishopric of Ravenna in 905. In 914 Theodora caused her lover to be elected pope. In narrating these criminal acts the Cardinal Baronius stigmatizes them with all the indignant epithets which occur to an honourable man; but he also points out the wonderful, and to his mind the manifestly divine, way in which a papacy so degraded is in a short time raised up to become the admired and feared of men. John X. was a man of powerful and intrepid character, and if he had been a secular prince would have won renown; but one reads with a shock of his riding forth at the head of his army to battle against the Saracens, in company with the Emperor Berenger, whom he had crowned at St. Peter's, 916. For fourteen years this warrior-pope occupied the chair of Peter. He had gained it, so repute said, by the power of the shameless Theodora; he lost it by that of her equally shameless daughter Marozia. This woman aspired to rule Rome as her mother had done, and by 925 the Pope and Marozia were at open feud. At length, aided by her numerous lovers, Marozia seized the Castle of St. Angelo, commanding the city of Rome; and offering her hand and the Holy City, was accepted as a wife (strange as it may seem) by Guido, duke of Tuscany. John X. was flung into a prison and died there, 928. Some say he lingered to a slow death, others that Marozia, tired of waiting for nature, caused him to be smothered with a pillow.

JOHN XI. was the son of this horrible Marozia, and Liutprand records the universal belief that he was the child of Pope Sergius III. A little time elapsed after the murder of John X., with a shadowy Leo VI., a shadowy Stephen VII., before even Marozia felt able to crown her son pope. One is glad to know the end of these horrors. By fair means or foul Marozia got rid of her husband Guido, and actually was married to his half-brother, the King of Italy, in the Castle of St. Angelo! Her son Alberico, by a former husband (or lover), was insulted by his new stepfather. He was a daring youth and at once flew to arms, attacked the castle, and was master of it even before King Hugh's own troops could arrive to assist the garrison. Hugh escaped, but the Pope and his infamous mother were caught and thrown into a dungeon (932). John XI. was allowed only to perform the services of the church, and lingered thus a prisoner of his half-brother till 936, when he died in St. Angelo.

JOHN XII., whose name was *Octavian*, was the last of these Theodora-Marozia popes. He was the son of that Alberico under whom Marozia had died in prison, and grandson, therefore, of that infamous creature. Alberico had been master of Rome for twenty-two years, and had appointed pope after pope. Octavian succeeded his father when nineteen years of age (953), and when Pope Agapetus died (955) Octavian ruled the church as John XII., retaining his own name for the civil government (January, 956). Threatened by Berenger, king of Italy, John called the Emperor Otto the Great to his help, and crowned him emperor at Rome in 962. When, therefore, the Romans complained to the emperor of the great and growing license and cruelty of John, Otto begged for time for amendment for so young a man. But John was plotting against the emperor, and on Adalbert, the new king of Italy, joining the pope in arms, Otto advanced on Rome. The people welcomed him as a deliverer. Pope John, who was in full armour endeavouring to lead a defence, fled with King Adalbert. The emperor at once called a church council, and great was his amazement to hear accusations of heresy and of the most shameful obscenity showered upon John XII. from all sides, charges with which modern pages cannot be sullied. Thrice was John cited before the council. He sent back the message that he had "gone out shooting." Urged by every one the good emperor declared John XII. deposed, and the chief-secretary Leo was chosen pope in his stead. But hardly had Otto left

Rome in pursuit of the rebel King Adalbert, when the partisans of John threw open the gates and the Pope re-entered Rome. He was fully master of the city for the moment, and his vengeance was terrible. Calling before him the cardinals and bishops who had attended the late council, he cut off the right hand of one, the ears of another, the nose of another, the fingers of another, and sent them off to seek their protector the emperor! Then in a council of his own partisans he deposed Pope Leo and annulled his own deposition. But while he was engaged in his profligate courses in a by-lane of Rome he was struck down by the dagger of an injured brother or husband, 14th May, 964. Probably he was the worst pope who ever reigned. The people of Rome elected a new pope, whom they called Benedict V. But Otho returned in anger to Rome with his army, demanding who dared to assume pontifical robes during the lifetime of Pope Leo. Benedict fell on his knees, himself took off the pallium, and handed it and his crozier to Leo, who broke the staff and sent the prelate into exile. Otho returned to Germany in 965, and Leo died immediately after his departure. By the emperor's order the Bishop of Narni was elected pope, and took the name of John XIII.

JOHN XIII. had to face a revolt immediately on his election, was thrown into prison, and for ten months was an exile from Rome. For the third time Otho crossed the Alps (966), quelled the revolt with much cruelty, and with a firm hand kept order during the time of John's reign. John XIII. died 972.

JOHN XIV. (not a Roman) was raised to the papacy from the bishopric of Pavia by the Emperor Otho II., 983; but was seized in a revolt, flung into the dungeons of St. Angelo, and there starved or poisoned by Bonifazio Franccone, who assumed the papal crown as the successor of his victim, August, 984. Bonifazio died almost immediately in a mysterious way. A Roman noble was elected his successor as JOHN XV., but failing to agree with the consul Crescentinus, descendant of the infamous Marozia and master of the Holy City, was exiled to Tuscany. He returned under the protection of the young Otho III., and reigned without further opposition for eleven years, dying in 996. On his death Otho III. was asked to name a new pope, and appointed his kinsman Bruno, who took the name of Gregory V. But this did not at all go with the design of the consul Crescentinus, who induced a Calabrian Greek of mean birth, called Philagathos, who had arrived at the dignity of Bishop of Placentia, to figure as antipope with the title of JOHN XVI., agreeing to divide the dominion of Rome with him. Otho caught Philagathos and delivered him over to Gregory V., who caused his nose to be cut off and his eyes and tongue plucked out, and thus to be paraded through the streets on an ass, his face to the tail. Crescentinus also perished (998).

JOHN XVII. (*Sieco*) succeeded Silvester II. in 1003, and died the same year. JOHN XVIII. (*Phasian*) then succeeded. He abdicated in 1009, and died the same year. JOHN XIX. (Romano, of the powerful house of Tusculum, descendants of the infamous Marozia) succeeded by his family influence to his brother Benedict VIII. in 1024. He was a layman, therefore he was passed through all the degrees of the church in one day. He crowned the Emperor Conrad, 1027, in the presence of King Canute of England. He was driven from Rome in 1033, but was restored by Conrad. He died the same year.

JOHN XX. is rather a mythical personage. Some historians (as Milman, "Latin Christianity," London, fourth edition, 1883) omit him altogether, passing from John XIX. to John XXI.; others, such as Bishop Milner ("End of Religious Controversy"), insert him as a lawful pope before Benedict IX.; others, such as the learned Vatican librarian Platina ("History of the Lives of the Popes," Rome, 1749), make him an antipope, rival and contem-

porary of Silvester III. in 1043, and therefore after Benedict IX.

JOHN XXI. (the Portuguese Pedro Juliani, cardinal-bishop of Tusculum), elected in 1276, was crushed by the falling in of a roof in a splendid new palace he was constructing, 15th May, 1277.

JOHN XXII. (Jacques D'Euse, cardinal of Porto) was one of the Avignon popes. He was born at Cahors about 1244. He was the son of a cobbler, like Urban IV.; and he was small in stature and deformed. He went as a poor scholar to Naples, and entered the king's service as tutor. Here he won golden opinions, took orders, received ample preferment, and was appointed Bishop of Lújus in 1300 by Boniface VIII. He remained with the King of Naples, however, his see being in Provence, the French territory of that king. Going on an embassy later to the Avignon pope Clement V., his great ability was recognized by Clement, and he was appointed archbishop of the metropolitan see of Avignon, the residence of the popes themselves. From there, helped by the plentiful gold of his former pupil, the King of Naples, it was not a long step to the cardinalate and thence to the papal see. The little deformed son of the Cahors cobbler, now cardinal of Porto, was desired by the other cardinals to name a pope, whom they all swore to accept, thus ending the weary conclave, which had had its hall set on fire by the impatient populace to quicken its never-ending intrigues. He named *himself*; and that under a promise never to mount horse or mule till he should set out on the return to Italy. He kept his vow; after his coronation at Lyons he dropped down the Rhone in a boat to Avignon, and resumed the exile which Clement V. had begun (1316). John XXII. was a learned pope; he was skilled in magical lore, and set up a fierce Inquisition against all sorcery and magical art, and many perished through this. On the other hand, he was equally bitter against the FRATICELLI, the ascetic branch of the now wealthy Franciscan order. Since the Inquisition was in the hands of the Dominicans, rivals and enemies of the Franciscans, any heresies of the latter were sure to meet with small mercy. The Fraticelli developed strange spiritual doctrines of a symbolic kind; they denounced the wealth of their own order and the scandals of the papacy; they attacked doubly, therefore, the learned and avaricious John XXII. They even dared to pronounce that Christ and his apostles had been absolutely poor. The Pope seized the heretics, others sprang up, the quarrel spread, and eventually the whole Franciscan order was in a blaze on this question of the poverty of Christ. John XXII. did not hesitate. He annulled the bull of Nicholas IV. on the subject, and himself issued a new decree—"that all those who declared that Christ and his apostles had no property, only use of things necessary, were guilty of damnable heresy" (1322). The Franciscans brought a counter-charge of heresy against the Pope himself, and their general, Michele di Cesena, denounced John to his face at Avignon in 1328, naming twelve articles of heresy of which he accused him. The general had to flee for his life. He fled to Pisa, and Pope John proclaimed his deposition, causing Bertrand di Torie to be elected general. No pope was freer with his bulls and excommunications than John XXII. Thus after the Franciscans in 1322 he excommunicated Louis of Bavaria on his accession to the empire, 1323, since he had a design to confer the empire on the King of France; then it was the Visconti, lords of Milan, who fell under excommunication in 1324 for allying themselves with Louis, and so forth. Finally Louis, who had been in nowise hurt by these maledictions, to which his subjects paid but little attention, entered Italy to assert his imperial feudatory rights, received submission and tribute everywhere, and was crowned at Rome. He then cited Pope John to appear before him; and this naturally failing to produce a man who was away at Avignon, a

herald called many times upon "any one ready to defend the priest James of Cahors, who calls himself Pope John XXII." No one appearing the Pope was formally condemned for heresy and treason by the emperor and deposed (1328). Four days later a daring priest nailed to the door of St. Marcellus for answer a long denunciatory brief from John XXII., and escaped safely, to be rewarded with a rich bishopric. Louis in a week or two was ready with a new pope, Piero di Corvara, a native of the Abruzzi, who took the title of Nicholas V. But the King of Naples began to advance in the Guelph interest, and emperor and emperor's pope fled to Viterbo. Eventually Louis left Italy, and Nicholas V. was taken and conveyed to Avignon. There, with a halter round his neck, he confessed his impiety and begged for mercy. John XXII. embraced him as a prodigal son, and kept him in honourable confinement at Avignon till his death in 1334, not long before his own. But John himself, now nearly ninety years old, was betrayed into a most alarming heresy, namely, that "till the day of judgment the saints did not behold the beatific vision of God." Michele di Cesena fled to Paris to the king, who hungered after the wealth of Avignon, a city in his kingdom of France and yet not of it, for the popes had bought it of Joanna, queen of Naples (they never paid for it, but that is a matter of detail); and he was making ready when John, stricken with mortal sickness, made a deathbed recantation and died the next day, 4th December, 1334. His avarice was unbounded; he left in his coffers no less than 18,000,000 florins of gold in specie, and 7,000,000 florins in plate and jewels. The brother of the historian Villani took the inventory. The method of accumulation had been by the gradual seizure of collegiate benefices under pretext of discouraging simony, and by the step-by-step promotion of prelates in the church; even a bishop promoted to a fatter bishopric having to pay his annates or first-fruits.

JOHN XXIII. (Balthasar Cossa) was elected to end the great schism on the death of Alexander V., who died only ten months after his choice for that purpose. Alexander's death was attributed to poison, and Balthasar Cossa was not free from suspicion. He was a Neapolitan, a man of vile life, had been a pirate in his younger days, and was accused of various acts of immorality; but the great wealth he had amassed was spent like water at the conclave, and he was elected pope (1410)—elected, too, at a time when there were already two popes, Gregory XII. and Benedict XIII., and when his mission as church-pope was to restore unity to Christendom by his superior virtue and authority! His life was so scandalous that he feared to face the necessary council; but at last he convoked the Council of Constance, 1413, and opened it November, 1414. As he had dreaded, he was denounced and compelled to abdicate (1415) conditionally upon the other popes also abdicating. He fled in the disguise of a groom to Schaffhausen. The council excommunicated him for his treason, and he fled further, to Fribourg. He was deposed in May, 1415, upon charges so horrible and obscene that sixteen of the worst were omitted from the judgment for the sake of decency and the dignity of the papal office. He was caught and brought to a prison just outside the walls of Constance. He lay in prison, now here now there, for nearly four years. Finally he was brought forward at Florence in May, 1419, to express contrition for his sins at the feet of the new pope, Martin V., who was acknowledged at length by the whole church. Balthasar Cossa, some time John XXIII., was ordered severe penance; but after some days of this he was forgiven, and was made head of the Sacred College of Cardinals. He died in the following November (1419); the republic of Florence buried him, and his tomb may yet be seen under the great dome of Brunellesco which surmounts Santa Maria del Fiore.

JOHN DORY. See DORY.

JOHN, KNIGHTS OF ST., OF JERUSALEM, also called *Knights Hospitallers*, *Knights of Rhodes*, or *Knights of Malta*. This was the title of the great order of semi-monastic warriors which was founded in the year 1048. It soon found a rival in the *Templars*. But the elder order eventually overcame and outlived the *Templars*. In their origin the *Templars* had for function to protect pilgrims on their way to the site of the temple at Jerusalem, and the *Hospitallers* to provide *hospitium* or entertainment for them on the journey and when they arrived. Commanderies or hospices were provided also in various countries to grant aid to pilgrims starting on the journey. The *Knights Hospitallers* of St. John of Jerusalem established themselves in England in 1100, with the double object of providing a centre for recruits and for receiving gifts for their body and founding a residence at the court of a powerful prince with whom they might work in conjunction. It is needless to say that the original function of both *Templars* and *Hospitallers* was soon occasionally lost sight of and gradually disappeared. The vows of poverty, chastity, and obedience were no better observed. The order grew immensely rich, though not nearly so rich nor so powerful as the *Templars* in England. In 1113 Pope Paschal II. gave the *Knights* of St. John the power to elect their own superior, and their grand-master, Raymond du Puy, settled the statutes of the order in 1118. The order consisted of three grades, knights, chaplains, and serving brothers, the last being the rank and file in the military expeditions. It soon spread into various kingdoms, and at its greatest power had eight grand priories, those of Aragon, Auvergne, Castile, England, France, Germany, Italy, and Provence. Each grand priory was located in the capital city of the kingdom, and had several commanderies or hospices scattered throughout the nation depending upon the central institution. St. John's Gate, Clerkenwell, is a relic of their London grand priory, which sent its head to the House of Lords as premier baron of the realm of England. The garb of the *Knights* of St. John was a long black cloak or robe with a pointed hood, a large Maltese cross in white silk on the left breast. The golden cross of the order, suspended by a black ribbon, hung from the neck. Their war garb was a scarlet surcoat above the usual armour, emblazoned with the well-known Maltese cross in silver on the breast and back. The Emperor Frederick Barbarossa protected the order with all his unrivalled power, and from the weighty privileges granted by him the fortunes of the knights must be dated. When Palestine finally fell, the *Knights* of St. John, after a valiant defence of Acre in 1290, settled at Limasol in Cyprus by invitation of King Henry II. of Cyprus, in 1297, and left that island for the island of Rhodes, which they captured from the Turks in 1309, led by their greatest grand-master, De Vallaret. This they ruled for over two centuries as a kind of Venice, having added six other islands to Rhodes itself, with the grand-master for doge and the knights companions for patricians. After defeating a powerful attempt at recapture by the Turks, they grew immensely rich and powerful. When the *Templars* were suppressed by Edward II. in England in 1309 their property was taken by the government. The buildings known as the Temple in London, the headquarters of the order, were bought by the professors of the common law and converted into Inns of Court in 1311. At the Council of Vienna in 1312 the order of *Templars* was formally abolished by the church, and its possessions were ordered to be given to the *Knights* of St. John. But a small portion only reached them, each king retaining the bulk of the plunder for himself. However, there was enough left to increase very greatly the wealth and power of the order. It acquired Smyrna in addition to Rhodes in 1344. However, in 1480, the great warrior-sultan Mohammed II. shook the power of the *Knights* of St. John, though he

failed to dislodge them from Rhodes, and in 1522 the Sultan Solymay II. succeeded in recapturing Rhodes and reuniting it to the Turkish dominions. The knights were dispersed, most of them retiring first to Crete, then to Sicily. Pope Adrian VI. assigned Viterbo to them, but the Emperor Charles V. taking pity upon their misfortunes gave them Malta with Tripoli and Gozo in 1530, and very speedily they made Malta into another Rhodes for opulence and luxury. They withstood a determined attack of the Turks in 1565. Henry VIII. of England did not spare the Hospitallers in his attack upon the wealthy monastic establishments of England, and the order was suppressed by him in 1540. It was restored by Mary in 1557, and finally suppressed by Elizabeth in 1559. It suffered another suppression—namely, from France—at the hands of the Legislative Assembly, in 1792. It had now become effete. Such an institution still existent as a sovereign power close upon the nineteenth century was an absurdity. Consequently Napoleon on his journey to Egypt in 1798, as general of the Directory of France, easily arranged with the grand-master, De Hompesch, that after a siege which was but a sham, Malta should be surrendered to France. But as soon as Napoleon's back was turned revolts broke out, aided, perhaps incited, by England. Eventually England took possession of the island in 1800. Meanwhile the knights had dispersed in all directions. Their estates in all countries were confiscated by the respective governments. However, the Emperor Paul of Russia declared himself grand-master in 1799, and the hopes of the knights revived. But after his murder in 1801 no other was appointed, and the order may be said to have ceased. The deputy grand-master in Spain still existed, and this branch of the order has continued as a kind of ornamental freemasonry to the present time. A few knights are also to be found in Italy and in Russia.

JOHN, KNIGHTS OF ST. (*Johanniter Ritter*), is the name of a Lutheran order founded in 1812 by Frederick William III. of Prussia, and reorganized in 1852. These knights joined the Knights of St. John of Malta in assisting the wounded in the Franco-Prussian War of 1870, the Duke of Manchester being prior of England at the time. Hence arose the St. John's Ambulance Association, a society of amateur nurses gratuitously instructed from time to time by surgeons throughout the country in a course of hospital nursing of ambulance cases—a valuable centre of help, if unhappily occasion for such services should arise.

JOHN OF GAUNT, "time-honoured Lancaster," as Shakspeare calls him in his play of "Richard II.," was the fourth son of Edward III. and the father of King Henry IV. He was himself a prince of distinguished valour, a typical example of the feudal baron, with all his good qualities and his bad, and was second only to the king and to his brother the Black Prince in the governance of the realm. He was born at Ghent (*Gaunt*) in 1339, and in 1359 married the widow of the first Duke of Lancaster. His father, Edward III., created him duke in 1362, and granted him a special chancery and palatine privileges in 1377, which have remained to Lancaster ever since, so that our kings are dukes of Lancaster and rule it as a sovereign duchy. The new duke distinguished himself under the Black Prince at Najara in 1367, and married as his second wife Constance, daughter of Peter the Cruel, assuming as a consequence the style of King of Castile, 1370. But reverses occasioned by the fatal sickness of the Black Prince drew John of Gaunt from his Spanish claims, and he hurriedly assumed leadership of the English forces, marching boldly into the heart of France, the French, by the command of Charles V., retreating constantly before him and wasting the land. His forces fell away and winter overtook him in Auvergne. He had to fall back on Bordeaux, and only that town and Bayonne remained faithful

(1373). At home all was in confusion, and when the duke returned and seized the government his arbitrary rule was called in grave question by the "Good Parliament" of 1376. The dying Black Prince supported the demands of the Commons for inquiry into the abuses of the government. Lancaster withdrew from the council, but his brother died and he at once returned. Of a population of 2,000,000, between 20,000 and 30,000 were ecclesiastics, and owned at least a third of the land. In the distress through the long war, the dotage of the old king, and the misgovernment, Lancaster looked on these large possessions longingly. He was aided in his contention that they were subject to crown control by the great teacher JOHN WYCLIF, master of Balliol College and rector of Lutterworth. In return, when Wyclif taught that a spiritual dominion was of God, who granted it as fief, he set out to each man, so that each man's spiritual lord was God; and when he defied the excommunication which followed, the Duke of Lancaster stood by his side in St. Paul's and saved his life by military power (February, 1377). In 1378 John of Gaunt was conducting the war in France, and besieging St. Malo; in 1380 he was invading Scotland, which had allied itself with France, and with which he concluded a truce at the end of the year. The next year was the year of the great peasants' revolt under Wat Tyler, and Lancaster, as the representative of the stern feudal baronage, was especially singled out by the insurgents. He fled to Scotland and left his palace to be burnt by the mob. He did not stand well with the young king Richard II. for some years; but eventually he obtained permission to revive his claim to the kingdom of Castile, and invaded that country unsuccessfully in 1386. He had to retire, after one campaign, into Gascony. Finally he agreed to marry his daughter to the heir of Castile and returned to England in 1389. Richard created him Duke of Aquitaine for his life in 1390. In 1391 he married Dame Catherine Swynford, who had been his mistress for some time, and by whom he had had sons. These were legitimated, and grew up to be the famous Duke of Somerset and Cardinal Beaufort, bishop of Winchester, guardians of the realm under Henry VI. He died in 1399, but his estates instead of passing to his son Henry, duke of Hereford, were seized by Richard II. Henry, who had been banished, returned to claim his inheritance while Richard was absent in Ireland, with what further result we know.

John of Gaunt was the same age as Chaucer, and a lifelong friendship existed between them. He was very good not only to Chaucer, but to his son Thomas, and to his daughter, for whom he purchased a novitiate at Barking nunnery at a cost of about £500 of our money. In return, he is celebrated in Chaucer's poems, though never directly named. Chaucer held a post in the Customs by favour of John of Gaunt, and he was turned out of this with some ignominy during the duke's absence in Portugal fighting for his visionary crown.

JOHN O'GROAT'S HOUSE, Scotland, in the county of Caithness, 1½ mile west from Duncansby Head, is a site once occupied by a cottage, and proverbially nearly the most northern point of Great Britain. According to tradition the name is a corruption of John de Groot, a Dutchman who settled at the spot about the reign of James IV., and arranged a dispute among his eight sons upon a point of precedence, by making eight doors to his dwelling, by which means they passed in and out without quarrel. Whatever may be the value of the tradition, there can be no doubt as to the existence of a John Groot, for in 1496 "John Groot, son of Hugh Groot, had a grant of a penny-land in Duncansby, from William, earl of Caithness." The family still exists.

JOHN OF SALISBURY finds a place in every catalogue of learned Englishmen. His era was the reign of King Henry II. He was born about 1120; he studied

at Oxford, but he visited also the universities of France and Italy. He became secretary to Theobald, archbishop of Canterbury, and when his old fellow-student Thomas A'Becket became archbishop, John of Salisbury took service under him, shared his exile, and only by the merest accident escaped sharing his assassination also. He became bishop of Chartres in 1176 and died in 1180. His principal historical writings were lives of two archbishops of Canterbury, Anselm and Thomas A'Becket. But the work by which he is best known to scholars is entitled "*Polierations, sive de Nugis Curialium et Vestigiis Philosophorum*" (On the Trifles of Courtiers and the Footsteps of Philosophers), in which he describes the manners of the great, speaking not unfrequently in a style of sharp satire. It was of course a hit at the evil habits of courts in return for the current depreciation of the monastery and the cloister.

JOHN, ST., THE APOSTLE, was the son of Zebedee, a fisherman of Galilee, and Salome. A disciple of John the Baptist he first became acquainted with Jesus at Bethabara beyond Jordan, where John was baptizing, and he was called by Jesus to the apostleship at the same time as Simon Peter and Andrew and his own brother James. The mother of John was a follower of Jesus, and she is mentioned as being one of those who ministered unto him during life and remained faithful at the time of his crucifixion and entombment. Among the apostles three were chosen by the Master to receive special marks of his favour, and of the three John is specially referred to as the one whom Jesus loved. He alone among the apostles was present at the cross, and after the resurrection of Jesus he took a prominent position as a witness of that event. After the preaching of the gospel by the deacon Philip in Samaria, John was sent there in company with Peter, and we learn from Gal. ii. 9 that at a later period he was staying at Jerusalem. According to tradition John afterwards proceeded to Ephesus, where he remained for many years. In the persecution under Domitian he was condemned to be thrown into a cauldron of boiling oil, which had no power over him, and he was then banished to Patmos. When the persecution ceased he returned to Ephesus, where at a great age he died, having long outlived his fellow-apostles. That some of the stories told concerning him are of a legendary character is evident, but there is no reason to doubt the account of his ministry and death at Ephesus. The works attributed to St. John are the fourth Gospel, three epistles, and the Book of Revelation. The first of these has already been noticed under GOSPELS, and the last under APOCALYPSE. With respect to the Epistles the first bears the most unmistakable resemblances to the fourth Gospel in its teaching, style, and choice of words, and nearly all critics are agreed that it is by the same author. The external evidence in its favour is very strong, for it is quoted or referred to by Polycarp, Papias, Irenaeus, Origen, Clemens Alexandrinus, and others among the fathers, while Eusebius includes it among the books that were undisputed. It is not addressed to any special church, and it seems designed in the first instance as a summary of doctrine for the use of the church at Ephesus and the other churches of Asia Minor. There are two doubtful passages in this epistle, the first in the twenty-third verse of the second chapter, "But he that acknowledgeth the Son hath the Father also," and the other the second half of the seventh verse of the fifth chapter. The evidence preponderates in favour of the first of these, and it is retained in the revision of 1881; but the latter, which is unquestionably a forgery, is expunged. The second epistle, which consists only of thirteen verses, eight of which are found in the first epistle, was early placed among the disputed writings. Its genuineness, however, is well attested both by external and internal evidence. It is addressed, according to the authorized

and revised versions, to "the elect lady and her children," other interpretations of the greeting being "to the elect Kyria," or to "the lady Eclecta." It commends the lady for her fidelity and love of the truth, and warns her against the deception of certain false teachers. Many commentators have interpreted the elect lady as a symbol of a church, but the literal interpretation finds most favour among modern scholars. The third epistle is addressed to one Gaius, whom it is impossible to identify, and it seems to have been a letter of introduction given by John to certain unnamed preachers of the gospel, who are commended to his good offices. There is nothing either in the second or third epistles to indicate their date, or the place from whence they were written.

JOHN THE BAPTIST, the last of the Jewish prophets and the forerunner of Christ, was the son of Zachariah, a priest, and Elizabeth his wife, who was a near relation of Mary, the mother of Jesus. The circumstances of his birth are narrated by St. Luke in the first chapter of his Gospel. The place of his birth is merely referred to as a city in the hill country of Judea, but rabbinical tradition places it at Hebron, and at the present day the village of 'Ain Karim is pointed out as the spot, a convent being erected there. The ministry of John has already been referred to. [See JESUS CHRIST.] His influence seems to have been very great during the first year or two of his public labours, and even Herod the tetrarch feared him, and did many things in obedience to his teaching. When, however, Herod married Herodias, the wife of his own brother Philip of Idumaea, John sternly and publicly reprovved him, and thus aroused the undying hatred of Herodias. John was at first confined in the Castle of Machærus, on the eastern shore of the Dead Sea, but the resentment of Herodias could be appeased with nothing less than his death, which she obtained by means recorded by St. Matthew and St. Mark. The followers of John existed long after the rise of Christianity, as we learn from Acts xviii. 25, and xix. 1-4, and there is at the present day a sect in the East which calls itself after his name. A short notice of John is given by Josephus ("Ant." xviii. 51).

JOHN'S COLLEGE, ST., CAMBRIDGE, was projected and begun by Margaret, countess of Richmond, a short time before her death, which happened in 1509. It was completed by her executors, under the authority of a papal bull and the royal mandates of her son and grandson, King Henry VII. and King Henry VIII., which gave them the power of suppressing a decayed hospital dedicated to St. John, at that time existing on the same site. The college was four years in building. The fellowships and scholarships are open to all British subjects without any restriction or appropriation. There are also studentships in divinity and law, and several exhibitions and annual prizes.

The buildings of the college are now among the most handsome in Cambridge, a splendid new quadrangle, with master's lodge and chapel, having been added in 1869 from designs of Sir G. Scott, R.A. The chapel is modelled on that of Ste. Chapelle, in Paris, and is an exceedingly richly decorated building.

JOHN'S COLLEGE, ST., OXFORD, was founded in 1555 by Sir Thomas White, alderman of London. There are several open fellowships and scholarships, and other scholarships are appropriated to scholars educated at the Merchant Taylors' School who have not attained the age of nineteen. The buildings of St. John's College form chiefly two quadrangles, of which the first was originally St. Bernard's College, founded in the time of Henry VI. King Henry VIII. had granted these premises to Christ Church, Oxford, from which college Sir Thomas White purchased them in 1555. The second quadrangle was entirely built at the expense of Archbishop Laud. It was erected 1631-35 from a design furnished by Inigo Jones,

JOHN'S, ST., the capital of Newfoundland, British North America, situated on the east coast of the island, 3 miles from Cape Spear. It has a fine harbour, and is the centre of the trade of Newfoundland. The most important buildings are the handsome English and Roman Catholic cathedrals. The chief industries are iron-founding, oil-refining, tanning, and distilling, and it occupies an important position with regard to the fisheries off the coast. The population is 30,000.

JOHN'S, ST., the residence of the governor of the Leeward Islands, and the capital of the island of Antigua, is situated in the north-eastern part of the island, on a shallow bay. The town is well built, and the chief buildings are the cathedral, the court-house, and the market. The supply of water, which is scarce, for drinking purposes is chiefly derived from rain water collected in cisterns. The principal exports are sugar, rum, and molasses. Population, 9,000.

JOHN'S, ST., a city and seaport of New Brunswick, on its south coast, and one of the largest and most important towns of Canada. It is 130 miles W.S.W. from Halifax, and 190 miles E.N.E. from Augusta. It is sometimes called the "Liverpool of British America." It is most picturesquely situated on a rocky and almost insular eminence at the mouth of the St. John River, the entrance to which is protected by Partridge Island. The river, which forms a prominent feature in the harbour, together with its tributaries, has an almost uninterrupted steamboat navigation of 800 miles, and a further length of nearly 1000 miles navigable by boats and canoes. The whole upper portion of the city—rebuilt since the great fire of 20th June, 1877—stands on solid rock, which for the purpose of street construction has been excavated to a depth in many places of from 30 to 40 feet. The chief industries are shipbuilding and the export of timber. Population, 50,000.

At the end of the last century the site of this thriving city, with the exception of a few straggling huts, was covered with trees. This was its condition at the peace of 1763, since which time its growth has been extraordinary. Its chief importance is in its position, which must ever command the trade of the vast and fertile country watered by the lakes and streams of the river St. John.

JOHNSON, SAMUEL, an eminent English author, was the son of Michael Johnson, a bookseller of Lichfield, and was born there on 18th September, 1709. From his ancestry Johnson inherited a tendency to scrofula, from which, during his childhood, he suffered so severely that his face became deeply scarred and his eyesight and hearing seriously impaired. His education was commenced at Lichfield, whence he was removed to a school at Stourbridge, where he spent one year. Then after two years spent in irregular reading at home his parents were induced by the promises of a wealthy neighbour to send him to Oxford, and in 1728 he entered Pembroke College. Here he remained for three years, and though so poor as to be compelled at times to go in rags, he displayed a spirit of sturdy independence and even of rebellion against the discipline of the college. Through the increasing poverty of his father, and the failure of the neighbour to redeem his promises of support, Johnson was compelled to leave college in 1731 without taking his degree, and when his father died in the winter of the same year all he could leave to his son was the sum of £20. In addition to his poverty his disease before he left college had assailed him so severely as to leave him afflicted with incurable hypochondriasis, which through the remainder of his life asserted itself in the dismal forms of the dread of death and the fear of insanity. He at first attempted to earn his bread by becoming usher at a school in Market Bosworth, and finding this intolerable he went to Birmingham, where he obtained a little work in translating for a bookseller. At

this time he fell in love with the widow of a mercer of that town, Mrs. Elizabeth Porter, whom he married in 1736. Mrs. Porter was more than twenty years older than himself, but he was much attached to her, and retained his affection to the last. She was possessed of the sum of £800, with which Johnson endeavoured to start a school on his own account, but in eighteen months only three pupils came, and the scheme having failed Johnson, in 1737, came to London with one of his scholars, David Garrick, and endeavoured to obtain literary employment. It was an evil time for literary labour, for the period of patronage had passed away, and the support of the public was but feebly and slowly accorded, and though Johnson sought diligently for occupation from the booksellers, he was at first hardly able to obtain the common necessities of life. His first regular employment was in the service of Cave, an enterprising bookseller who had started the *Gentleman's Magazine*. One of the principal features of this magazine was the publication of the debates in Parliament, the law which forbade this being evaded by the use of fictitious names, and by placing the scene of the debates at Lilliput. It was Johnson's duty to write these debates from a few notes, and he also contributed numerous prefaces, lives, and miscellaneous papers. In 1738 he wrote a poem entitled "London," in imitation of the third satire of Juvenal, for which he received the sum of 10 guineas from Mr. Dodsley. It, however, ran through an entire edition in one week, and gained for Johnson some degree of reputation. In 1741 he published his "Life of Savage," with whom he had been on terms of friendship, and this work was well received by the reading public, and gave Johnson some standing with the booksellers. In 1747 a proposal was made to him to prepare a dictionary of the English language in two vols. folio, for which the booksellers promised to pay him 1500 guineas, and out of that sum he was to find materials and pay assistants. In 1749 he published "The Vanity of Human Wishes," a poem in imitation of the tenth satire of Juvenal; and in 1750 he commenced the issue of the *Rambler*, which came out regularly every Tuesday and Saturday until March, 1752, the last number being written within three days of the death of his wife. In 1755 the dictionary, which had taken much longer to complete than he had anticipated, appeared, and served to fully establish his fame, though it added nothing to his means, as all the money to which it was entitled had been already spent. He continued working with unabated energy, however, and among his short papers of this time there appeared one of the best of his writings, a review of Soame Jenyns's "Inquiry into the Origin of Evil." In the spring of 1758 he commenced the publication of the *Idler*, which was continued for two years, and in 1759 he wrote "Rasselas" in the evenings of one week and sold it for £100, to defray the costs of his mother's funeral and to meet some small debts she had contracted. In 1762 he received through Lord Bute a royal pension of £300 a year, and the days of his penury were at an end. With ease of circumstances, however, his native indolence revived; he wrote nothing for several years; and it was not until 1765 that he published his edition of Shakspeare, subscriptions for which he had received nine years before. In 1763 he made the acquaintance of James Boswell, and we have from this date, chiefly through the labours of this gentleman, as full and minute an account of the remainder of the life of Johnson as has ever been written of any individual, save possibly Thomas Carlyle. In 1764 the celebrated literary society, entitled "The Club," was formed by Sir Joshua Reynolds and Dr. Johnson, and it included among its members Burke, Gibbon, Goldsmith, Garrick, Sir William Jones, Topham Beauclerc, and Bonnet Langton. Among these celebrated men Johnson was the acknowledged leader, and the society is often referred to as "Johnson's Club." In 1765 the

University of Dublin conferred upon him a doctor's degree, but he did not use the title until ten years afterwards, when it was conferred upon him by the University of Oxford. About the same time he made the acquaintance of Mr. and Mrs. Thrale, with whom he formed a close friendship that lasted many years. Mr. Thrale was an opulent London brewer, and he provided Johnson with an apartment at the brewery at Southwark and also at his villa at Streatham, at which Johnson passed a large portion of every year. Mrs. Thrale entertained an intense admiration for Johnson, and found pleasure in ministering to his comfort in health, and in nursing him when his affliction pressed most heavily upon him. He accompanied his friends to Bath, Brighton, and Wales, and with them made a short excursion to Paris. But he still maintained his own home in Bolt Court, Fleet Street, where he supported several dependants, both male and female, whose only recommendations seem to have been their helplessness and poverty. In 1773, when Johnson was sixty-four years of age, Boswell prevailed upon him to take a journey to Scotland. The account of this visit, entitled a "Journey to the Western Isles of Scotland," is one of the best of his works. About this time he also published a poor pamphlet directed against the American colonists, entitled "Taxation no Tyranny." In 1777, by the invitation of forty leading booksellers, he commenced the last of his literary labours in the "Lives of the Poets," which was published in four vols. 8vo in 1781. Johnson's last days were clouded by the loss of many of his best friends, by the inroads of disease, and by an increase of the gloomy anticipations of death by which he had always been tormented. He was, however, tended with the greatest care and assiduity by some faithful friends, and as the end approached his mind became calm and serene, and he met death at last with calmness and courage, 13th December, 1781. He was buried in Westminster Abbey, near the foot of Shakspeare's monument and close to the grave of Garrick.

Johnson's works, good as they are, lose incalculably by their artificial style. Macaulay happily designated their Latinized diction "Johnsonese," as if it were a language apart. His conversation was better than his books, and his biographer has rendered an inestimable service to literature in preserving from oblivion so many of his comments, criticisms, remarks, and sayings. With all his dogmatism, his rudeness, and his insufferable opinionativeness he was still one of the best talkers of his time. The strong common sense, the keen insight into character, the wide range of knowledge, the wit and judgment to be found in his recorded conversations, are sufficient to fully justify the reputation he gained in his lifetime. Though not specially distinguished as a scholar, his attainments were regarded with respect by his contemporaries, and were sufficient to form a solid basis for his fame. A lover of books and a wide reader, he forgot nothing that he read, and though he hated, as he said, to read books through, he had the knack of quickly extracting from any book that he took in hand everything of importance that it contained. His experience of life had been extensive, and all the scenes in its panorama had been unfolded before him. Penury and wealth, ignorance and learning, obscurity and fame, were not merely names to him; he had passed through so much that when he spoke of them he showed that he had weighed and contemplated them as realities. Then he had carefully studied the art of conversation, and he accustomed himself to speak with precision, to express himself with force and clearness, and to command attention by dignity of expression and demeanour. Always ready to acquire fresh information, he was a good listener to any one who was able to add to his store, and though he hated questioning, and sometimes resented it rudely, he was always willing to impart knowledge where he saw a disposition to receive it. In the presence of such of his contemporaries and friends as possessed reputations

for wit and learning he exerted himself to the utmost to justify and retain the ascendancy that was invariably accorded him. On the other hand, in his eagerness to display his powers he sometimes took the wrong side by intention, and he was often too anxious for victory to acknowledge himself in the wrong, even when plainly convinced of his mistakes.

But beyond his fame as a philosopher and author his memory is valuable for the lessons that may be learned from his character. Condemned to struggle in youth and early manhood with poverty, disease, and disfigurement, his spirit rose above his misfortunes, and he preserved through them all a spirit of sturdy self-respect and independence. Throughout the whole of his life he had to bear the burden of disease, so that he could speak of himself as being the subject of a vile melancholy that at times made him half insane, yet he accomplished an immense amount of useful and solid literary work. We find in his life nothing of the railing against Providence or denial of its existence with which we are so familiar at the present, nor at the worst period of his social humiliation any swerving from the political views he had accepted, or rebellion against what he felt to be the necessary order of society. Rude and overbearing at times among those who were socially his equals, he was patient and tender to all who were dependent upon him, and none who knew him intimately could ever doubt the essential kindness and generosity of his disposition. Few books of biography have ever been so widely read as that which is devoted to the record of his life, and few readers ever put the book aside without the feeling that they have found depicted in it a character admirable for courage, patience, earnestness, and magnanimity, the history of a great and a good man.

Boswell's "Life of Samuel Johnson, LL.D." was published in 1791 in two vols. 4to, and this valuable and interesting work, which Macaulay pronounced to be the best biography ever written, still remains the principal authority. Numerous editions of this book have appeared, the best known until recently being that of John Wilson Croker. All former editions, however, have been superseded for completeness by the issue of that of Alexander Napier, M.A. (five vols., London, 1884). In this edition the original text of Boswell has been restored, and there is given in addition the "Tour to the Hebrides," and nearly all the authentic anecdotes of Johnson that have been collected since the original biography was written. The best editions of Johnson's works are those by Hawkins (fifteen vols., London, 1787-89), and Murphy (twelve vols., London, 1792; second edition, 1824).

JOHNSTON, ALEXANDER KEITH, LL.D., F.R.S., a celebrated British cartographer, was born at Kirkhill, near Edinburgh, 28th December, 1801, and educated at the High School of Edinburgh. He served his apprenticeship as an engraver, and about 1830 he joined his brother, Sir William Johnston, in a printing and engraving business at Edinburgh. His first important work, the "National Atlas" of general geography, appeared in 1843, and it gained for him the appointment of geographer-royal for Scotland. In 1848 there appeared his "Physical Atlas of Natural Phenomena," which was pronounced by the Geographical Society of Paris "one of the most magnificent monuments that had yet been raised to the scientific genius of the age." A second enlarged edition of this was issued in 1856. In 1850 he published "Johnston's Gazetteer," a valuable dictionary of geography, and in 1861 his "Royal Atlas of Geography," one of the finest works of the kind ever produced. In 1865 he received the degree of LL.D. from the Edinburgh University, and in 1871 the Royal Geographical Society awarded him its Victoria medal. He died 9th July, 1871. His son of the same name (born 1844, died 1879) was honourably known as a traveller and geographical writer.

JOINERY (Fr. *menuiserie*) is the art of joining pieces of wood together for the interior fittings of buildings, for making articles of furniture, and for numerous purposes requiring greater neatness of workmanship than the operations of the carpenter. As carpentry and joinery are in many cases carried on in the same establishment, and even by the same workmen, it would be difficult accurately to define the limits of these two kindred trades. The proper object of carpenter's work in a building is to give firmness and stability to the structure; and within its proper range may be embraced all the rough timber-work necessary for the support, division, or connection of the several parts of a building, the framing of floors, partitions, and roofs. Joinery has for its object the addition of all the fixed wood-work necessary for convenience or ornament.

JOINT AND SEVERAL, in English law, is a phrase used to imply that a contract is entered into or an obligation come under by each of several parties independently as well as jointly with the others. It is a general rule of law in England that a contract, unless otherwise stipulated, is joint, so that if an action is brought to enforce it all parties bound must be included. Where the words joint and several are used the case is altered, and the action may be brought against any one of them. Thus if two persons, A and B, accept a bill or promissory note jointly and severally, the creditor can enforce payment from either of them without regarding the other. If, however, one of them discharges the whole debt, he has a remedy against the other for the amount of his share in the obligation.

The Scotch equivalent is "conjunct and several."

JOINT-STOCK COMPANY, an association of individuals for the carrying on any business having the stock or capital divided into shares. It is generally used to designate such undertakings as devote themselves to work of a private nature, such as manufacturing, banking, or insurance, the associations which are formed to carry out the making of canals, harbours, railways, &c., being termed public companies. The latter have to be incorporated by special Act of Parliament, in which the objects of each company, its responsibilities and privileges, are carefully defined.

Formerly the shareholders in a company were liable personally to all the debts of the company after its assets were exhausted, and this rule still applies to all such associations as are of unlimited liability. The existence of such a contingency acted very unfavourably towards the employment of capital in joint-stock enterprise, and it sometimes worked mischief of the most terrible character, often involving persons who had taken only a small interest in a concern in complete ruin. The first attempt at limiting the liability of shareholders in England was made by 21 & 22 Vict. c. 91, in imitation of a plan which had already been tested in the United States. Several Acts to regulate the constitution and proceedings of joint-stock companies had been previously passed, but as it was found that under their various provisions continual questions of liability arose, this led in 1862 to the passing of one comprehensive Act, entitled The Companies Act, 1862 (25 & 26 Vict. c. 89), by which the laws relating to the incorporation, regulation, and winding up of trading companies and other associations were consolidated and amended. This Act was again amended in 1867 (30 & 31 Vict. c. 131), and by the Act of 1879 (42 & 43 Vict. c. 70), and in these statutes may be found the code now applicable to the United Kingdom.

By these Acts any seven or more persons may, by subscribing their names to a memorandum of association, and registering the same, form a company, with or without limited liability. The liability of the members may be limited to the amount, if any, unpaid on the shares held respectively by them, or to such amount as they may respectively undertake by the memorandum of association

to contribute to the assets of the company. No company, association, or partnership consisting of more than ten persons may be formed for the purpose of carrying on the business of banking unless it is registered as a company under the Companies Act, or is formed in pursuance of some other Act of Parliament, such as a local or personal Act, or in pursuance of letters-patent; and no company, association, or partnership consisting of more than twenty persons may be formed for the purpose of carrying on any business unless it is registered as a company under the Act, or is formed in pursuance of some other Act of Parliament, or of letters-patent, or is a company engaged in working mines within and subject to the jurisdiction of the Stannaries. A partnership of fewer than twenty persons is not bound to register, but it may do so with or without limited liability. The memorandum of association must be stamped and signed by each subscriber in presence of one witness, and the articles of association, which must state the rules of the company, must also be signed by the subscribers. The memorandum and articles of association must be delivered to the registrar of joint-stock companies for registration, and when they are registered a certificate of incorporation is granted. In the issuing of a prospectus for the formation of a joint-stock company any material mis-statement or suppression of a material fact is unlawful, and the directors who issue a prospectus are responsible for the representations it contains if they be untrue, whether they know them to be so or not. A copy of the memorandum of association, with the articles of association, must be forwarded to every member of a company at his request on payment of 1s., otherwise the company forfeits a penalty of £1 in each case. Every company which has a capital divided into shares is required once a year, at least, to make a list of all its members with their names, addresses, and occupations, and the number of shares held by each of them. This list of members must be kept at the registered office of the company, and be open to the inspection of members free, and to any other person on payment of 1s., and any such member or other person may require a copy thereof, or of any part thereof, on payment of 6d. for every hundred words. This list must also be sent to the registrar of joint-stock companies for his inspection. It is required also that each company shall have an office where its business is carried on, and that notice of the address of this office shall be given to the registrar.

The liability of a past member ends after he has ceased to be a member for one year; and he is liable to contribute to no debt contracted after he has ceased to be a member. The present members of a company are liable for its debts in the first instance, and no past member can be called upon to contribute unless the existing members are unable to pay the debts. In the case of a company limited by shares no contribution can be claimed from any member exceeding the amount, if any, unpaid on the shares in respect of which he is liable as a present or past member. All mortgages and charges on the property of the company must be registered. Limited banking companies, insurance and deposit, and provident or benefit societies under the Act, must at certain stated times make a return of their assets and liabilities, and place the same in a conspicuous part of their offices. A general meeting must be held at least every year. The articles of association may be altered at a general meeting by a special resolution carried by the vote of the majority at such meeting, provided that not less than three-fourths of the members be present. A copy of the resolution must be sent to every member, and one to the registrar of joint-stock companies. In certain cases the Board of Trade has the power to appoint one or more inspectors to examine and report on the affairs of a company. A company registered under the Act may be wound up under the following circumstances:—(1) When—

ever it passes a special resolution to this effect; (2) whenever it does not commence its business within a year from its incorporation, or suspends its business for a whole year; (3) whenever its numbers are reduced to less than seven; (4) in the event of it being unable to pay its debts; and (5) in any other case when ordered by the court of the Chancery Division.

The registrars of joint-stock companies are appointed by the Board of Trade, and the documents kept by each registrar are, under certain restrictions and on the payment of a small fee, open to the inspection of every one. Copies and extracts may also be obtained for a small charge.

A striking illustration of the dangers inherent in the constitution of unlimited companies in 1878 caused the passing of an Act in 1879, by which unlimited companies may change their constitution and become limited. Many important undertakings have taken advantage of this law, and their example is likely to be followed by others in the future.

The effect of the passing of the Companies Act has been something marvellous, and the capital that has been embarked in joint-stock enterprise since 1862 reaches to an enormous total, a sum considerably over £1,000,000,000. While, however, the Act has wonderfully facilitated the bringing of capital and enterprise together, it has also enabled a large number of fraudulent and dishonest men to plunder the public with impunity. Companies are continually started that not only have no reasonable prospect of success, but which are never intended to succeed from the outset. By mendacious statements in prospectuses and circulars, and liberal commissions paid to unscrupulous advertising brokers and financial agents, persons are induced to subscribe an amount of capital, which by comparatively simple methods passes into the pockets of the promoters and those intrusted with the winding up of the concern. There seems but little prospect of these practices being checked by legislative enactment at present, hence it is necessary for investors to examine very carefully the character of any company presented to their notice, and where they are unable to do this personally to seek competent professional advice.

In Scotland joint-stock companies may be divided into the following classes:—

(1) *Common law companies.* These are essentially partnerships, differing therefrom only in their large membership, and the necessary modifications of the partnership principles consequent thereon. [See PARTNERSHIP.] (2) *Chartered companies.* These are created by royal charter or by letters-patent (see 6 Geo. IV. c. 91 and 7 Will. IV. and 1 Viet. c. 73). They are proper corporations, with all the privileges of such, except in so far as the incorporating instrument may otherwise provide. (3) *Companies incorporated by Act of Parliament;* (4) *Companies under the Joint-stock Companies' Act;* and (5) *Companies registered under the Companies' Acts, 1862 and 1880.* With regard to all these classes except the first viz. common-law companies, it may be said that the law of Scotland is practically the same as that of England (see Clark on "Partnership and Joint-stock Companies").

JOINT TENANCY signifies joint ownership of two or more persons in land or other property, as goods and chattels. It differs from tenancy in common and co-partnership in the following essentials:—Joint tenants are considered to be severally seized or possessed of the undivided whole of the land or other property in which they have a joint interest, and also of their several shares, which shares are always equal shares, inasmuch as joint tenants take by purchase only and by a joint title; the estate or interest must be limited to the several persons by the same deed or instrument, and such estate or interest must vest in them at the same time, except (according to the more common opinion) the estate be limited to take

effect under the Statute of Uses or by devise, in which case the contemporaneous vesting of the several parts is not necessary; the whole estate or property goes to the survivors and survivor of the joint tenants if the jointure continue until such survivorship, which is the important characteristic of a joint tenancy. Any joint tenant may transfer his interest to any one of his companions by release; and any joint tenant may convey his share to a stranger by grant; or he may compel his companions to make a partition. Every person to whom the interest of a joint tenant is transferred becomes, as to such share, a tenant in common with the remaining joint tenants.

A joint tenant cannot dispose of either the whole or the part of the property in which he is jointly interested, consistently with the proper notion of a joint tenancy, by a will made during the continuance of the joint tenancy, even though he should happen to be the survivor; because until he has survived he has nothing to dispose of by will. But by severing the joint tenancy he acquires the power of disposing of his share by will. By the Act of 1 Viet. c. 26, a person may, by a will made according to the provisions of that Act, dispose of all real and personal estate to which he shall have a legal or equitable title at the time of his death, and which, if not disposed of by will, would go to his heir, or the heir of his ancestor, or to his personal representatives. But this Act gives no power of disposal over the unsevered interest of a joint tenant.

Joint tenancy is not a Scotch law term; but rights of an analogous kind may be created. Thus, a conveyance to "A and B jointly and the survivor and their heirs," would create a right very similar to joint tenancy.

JOINTS, in geology, are division planes other than bedding and cleavage that occur in one or more directions, each set having a rough parallelism, whereby the rock can be taken out in blocks, generally of a rhomboid or prismatic shape. In bedded rocks there are generally two sets of jointing, whose planes of division run more or less perpendicular to each other and to the planes of bedding. Those division planes whose outcrops run parallel or nearly so to the strike of the rock are termed *strike-joints*; while those running at right angles thereto are termed *dip-faults*. *Master-joints* are of a more pronounced character, keeping the same direction for long distances, and running through beds of great thickness; they differ from faults in having no lateral displacement. Jointing occurs most regularly in rocks having a hard homogeneous structure, such as limestones and compact grits and slates. In igneous rocks the jointing is generally less regular, though in granites there is generally at least one direction in which the joints run parallel. These are the *heads and courses* of the quarrymen.

JOINTURE is the income secured to a wife for life under her marriage settlement, and is accepted in lieu of dower. It is not a technical word in Scotland, but popularly has the same meaning as in England. It excludes the widow's *TERRER*.

JOINVILLE. The chronicler Jean Sire (Lord) de Joinville was born of a noble family of Champagne about 1224. Joinville accompanied Louis IX. of France in his first Crusade in 1248, and his narrative of the six years during which that Crusade lasted is extremely interesting, with an additional charm from its intensely personal character. It is entitled "Histoire de St. Louis IX., Roi de France, par Jehan Sire de Joinville," and has been often republished. One of the best editions is that by Ducange (folio, 1668). It has been translated into English by T. Johnes (two vols. 4to, 1807). Joinville, after his return to his native domain, continued to enjoy Louis' confidence. Joinville avoided the court of Philippe le Bel, but is said to have joined the army which Louis X. collected at Arras against the Flemish. He died not long after, but the precise date is not known. Joinville and his predecessor, Villehardouin, are among the oldest of the French chroniclers who wrote in the vernacular.

JOLLY-BOAT, the "generally useful" boat of a ship, usually somewhat broad in the bottom. The word is the same as *yawl*, another term for a boat, which comes from the Dutch *jol*. Boat is therefore a needless repetition. At present the derivation of the Dutch word is not known.

JOMINI, HENRI, Baron and General, the great historian of the military art, was a Swiss, born in the Pays de Vaud, 1779. He was aide-de-camp to Ney, 1805, and helped in the capitulation of Ulm, 1805; was chief of staff to Ney, 1806-9; became general, 1810; named "historiographer of the empire," 1811; governor of Wilna and Smolensko, 1812. He distinguished himself at Bautzen, 1813, but shortly after deserted to the allies, and accompanied the Emperor Alexander to Paris. He now took service under Russia. He became aide-de-camp to the Emperor Nicholas in 1825. He settled at Brussels in 1855, and died at Paris in 1869. His chief works are the famous "Treatise of Great Military Operations" (1804), "Military and Political Life of Napoleon" (1827), "The Art of War" (1838), and the "Military History of the Campaigns of the Revolution, 1792-1801" (1819-24).

JOMMELI, NICCOLO, one of the Neapolitan school of musical composers which completed the transition to our modern tonality. He was born near Naples in 1714, and died at Naples in 1774. When he was summoned to Rome in 1740, he had the powerful protection of the Cardinal Stuart of York ("Henry IX. of England"). He afterwards stayed at Venice, at Vienna, at Stuttgart, &c. His operas were very famous in their day, but all that can now be said to be living out of the work of a long life is his *Miserere* for two voices, almost his last work. Mozart admired the work of Jommelli, and speaks highly of it in his letters from Naples.

JONAH (Heb., dove), a Hebrew prophet who lived probably in the latter part of the reign of Jeroboam II. (n.c. 824-783), and is mentioned as delivering the word of Jehovah to Israel, 2 Kings xiv. 25. He is described as the son of Amittai, and as coming from Gath-hepher, a town of lower Galilee. The book of the prophet Jonah is included among the minor prophets, and if it is regarded as the work of the prophet himself it forms the earliest of the prophetic writings that has been preserved. The story of the Book of Jonah is too well known to need repetition here, but a word may be said as to the interpretation of the book. The theory that we have here a strictly historical narrative has been maintained by many orthodox commentators on the ground of the simplicity and directness of the language employed, and the references to the story of Jonah made by Jesus Christ (Matt. xii. 39-41; xvi. 4; Luke xi. 29, 30). It is also evident that it was accepted as a literal narrative by the Jews. On the other hand, many eminent biblical scholars have regarded the book as a symbolical or allegorical composition designed to teach the providence of God, the equality of Israelites and heathen before him, his readiness to forgive those who truly repent, and perhaps also the conditional character of prophecy. By Kuenen and others the composition of the book is assigned to the post-exilic period. (See "Notes on the Prophecies of Jonah and Hosea," Rev. W. Drake, Cambridge, 1853; Cheyne, "Jonah, a Study in Jewish Folk-lore and Religion," *Theological Review*, 1877; Köhler, "The Original Form of the Book of Jonah," *Theological Review*, 1879.)

JONES, INIGO, an eminent English architect, was born in 1573, in the neighbourhood of St. Paul's, London. By his talent for drawing he attracted the notice of William, earl of Pembroke, by whom he was sent to Italy, and found himself in an entirely new world of art, which he carefully studied. Jones returned to England in 1605, and was employed at court in devising the machinery and decorations of masques and pageants. He was appointed archi-

tect to the queen and to Prince Henry. After a second visit to Italy he was employed to build the palace at Whitehall; and soon after the only portion ever built of it, namely, the Banqueting House, was completed, he engaged in a task of a very different nature, that of ascertaining the origin and purpose of Stonehenge; but he left the question as he found it, a subject for speculation.

The Church of St. Paul, Covent Garden, York Stairs, and Ashburnham House, Westminster, yet remain among his works in the metropolis. To give a list of all the buildings attributed to him would occupy a considerable space. He died 5th July, 1651.

JONES, JOHN PAUL, the famous American sea-captain of the War of Independence, was born in Scotland, 6th July, 1747. His name was Paul; Jones was an addition of his own. He went to sea at the age of twelve, and, after making many voyages to America and other parts, was in 1768 made captain and supercargo of a vessel. Having made a good deal of money, he settled in Virginia in 1773, on a property which fell to him by the death of an elder brother. After the Declaration of Independence by the colonies, he offered his services in the war against his native country, in which he soon greatly distinguished himself. In 1778 and 1779 he cruised off the coasts of England and Scotland, and caused great alarm with his single ship. At Paris Louis XVI. presented him with a richly ornamented sword bearing a flattering inscription, he was invested with the military order of Merit, and received in every way the most distinguished reception, both from the government, the court, and in general society. On his return to America, in February, 1781, a gold medal was voted to him by Congress. He then served till the peace under the French Admiral D'Estaing, after which he proceeded to Paris with the appointment of agent for prize money. Some years afterwards he entered the Russian service with the rank of rear-admiral; but disputes with the Russian naval authorities soon compelled him to retire, on which he returned to Paris, where he died 18th July, 1792.

JONES, SIR WILLIAM, one of the greatest Oriental scholars England has produced, was born in London, 28th September, 1746. He was educated at Harrow and Oxford, and very early in life commenced to study Arabic, Hebrew, French, and Italian, in addition to the Latin and Greek required at school and college. In 1765 he was appointed tutor to the son of Earl Spencer, and retained this office until 1770, during which period he continued his studies with such assiduity as to obtain the reputation of being one of the first Oriental scholars of his age. In 1770 he published, at the request of the King of Denmark, Christian VII., a translation of the life of Nadir Shah from the Persian, and the same year there also appeared a treatise in French on Oriental poetry, and a translation into the same language of the odes of Hafiz. In 1771 he published a valuable Persian grammar, and replied in French to Anquetil du Perron, who had attacked the University of Oxford, and the following year he published a volume of poems translated from the Asiatic languages, and two essays on Eastern poetry and art. In 1774 he was called to the bar, and the same year issued his "Poeseos Asiaticae Commentariorum Libri Sex," a work designed to explain the nature of Oriental poetry to European scholars. In 1780 he completed and published translations of seven Arabic poems, known as the "Moallakat," also one or two essays on legal subjects, and some translations from the Greek. In 1783, having been appointed a judge in the supreme court of judicature at Fort William in Bengal and knighted, he proceeded to India; and in 1784 he founded at Calcutta the Asiatic Society, of which he remained the president until his death, and to the *Transactions* of which he was a voluminous contributor. During the next few years he devoted himself to the diligent study of Sanskrit, and having attained proficiency in this lan-

guage, he commenced a copious digest of Hindu and Mohammedan law from the original sources. This he left unfinished at his death, but it was afterwards completed by Colebrooke and published at Calcutta in 1800. While engaged upon this work Sir William also translated and published the "Sakuntala," a famous Indian drama, a collection of fables, the "Gitagovinda," a love poem, some portions of the Veda, and the "Institutes of Manu," the latter being published in 1794, in which year, on 27th April, he died of inflammation of the liver, in the forty-eighth year of his age. He was a man of immense industry, and at the time of his death he had acquired the mastery of thirteen languages, as well as an elementary knowledge of twenty-eight others. A complete edition of his works was published in six vols. 4to in 1799, and it was reprinted with a memoir in thirteen vols. 8vo in 1807. Although owing to a want of concentration of his immense powers Jones did not attain to eminence as an original discoverer or critic, his labours were of great service to the scholars of Europe, and served to open the way for the grand discoveries of the present century in the field of comparative philology.

JONGLEURS, the name of those itinerant musicians who in the middle ages were very numerous in France. They wandered about from province to province, singing and performing on the flute, viol, lute, or other instruments, at the courts of princes and nobles, by whom they were often liberally rewarded. They were something like the early troubadours or hardis; and one of their earliest employments was to attend and perform for these troubadours, who, from deficiency of technical musical knowledge, were unable to arrange and produce their own compositions.

JONKOPING, a town of Sweden, about 170 miles south-west of Stockholm. It is famous for its manufacture of lucifer matches, which are largely imported into the United Kingdom. A new industry has recently sprung up in the town, namely, the manufacture of paper from moss and wood. The population of the town in 1878 was 15,937.

JONQUIL or **JONQUILLE** (*Narcissus Jonquilla*), rush-leaved daffodil, a plant of the order AMARYLLIDACEÆ, or Narcissus family. The jonquil is well known; being one of the prettiest and sweetest of this tribe, it is a favourite in most gardens. When decocted it yields an acrid emetic quality. Two closely related forms are natives of Britain, namely, the common daffodil and the pale narcissus.

JONSON, BEN, an eminent Elizabethan poet, was not, as is often carelessly said, the son of a bricklayer. He was of good family, but his father had suffered persecution under Queen Mary, and had sunk into poverty. He died before Ben was born, and the widow married again two years later. Ben's stepfather was a master bricklayer, and the legend goes that he forced the boy to lay a few bricks; but so far from there being any proof or probability in this statement the reverse would seem to be the case, since, though himself not rich, he gave the boy the best education that the times afforded, first at a private school, and then under the famous Camden at the great public school of Westminster. From Westminster Ben Jonson went for a short time to Cambridge. He took service in the army, possibly through straitened means, and fought in the Netherlands. Returning to London with his knowledge of men thus added to his excellent scholarship, he threw himself into the arena where all the best thoughts of England then struggled for utterance, and which Shakespeare had already elevated to the noblest means of expression we yet possess—the stage. He began regular work for the stage as author and actor by 1597, or possibly the year before. He soon left off acting—his strength lay not that way. In 1598 the famous "Every Man in his Humour" made Jonson's reputation, and is interesting to us beyond its own great excellence in the proved fact that

Shakespeare acted in it in the character of Old Knowell. The portrait of Shakespeare in the folio of 1623 is now believed to be in the costume worn for this part. Other works began to flow from the poet's pen, but their good qualities aroused envy as well as praise, and the actor Henslowe's false taunt of the "bricklayer author" shows the length to which the former was carried. Jonson, all his life one of the hottest tempered of men, challenged and fought an actor who repeated the insult, killed him, and was thrown into prison; and here he met with such kindness from a Roman Catholic priest, a fellow-prisoner, that he was won over to Roman Catholicism. (He returned to Protestantism in 1610.) In 1599 the elaborate "Every Man out of his Humour" appeared and was represented before Queen Elizabeth, for whose preservation it contains so eloquent a prayer. But the great queen's death soon followed, and Ben Jonson, though his tragedy of "Sejanus" (1603) had had great success, and though he had produced other plays, chiefly comedies, with applause, found himself out of harmony with the new court. Frivolity, not wit; pageantry, not thought, were in demand at the court of James I. Ben Jonson's versatility was equal to the occasion, and he invented the entertainment called a "masque," greatly to the taste of the court, full of scenery and decorations, which latter the celebrated Inigo Jones provided. Some of Jonson's masques are very elegant, and of what the form is capable we know by the magnificent later example of Milton's "Comus." Ben Jonson, though a Roman Catholic, was often seen at court and basked in the royal favour, not without more substantial rewards also. He was of some assistance in the Gunpowder Plot, both to the government and to his loyal Catholic friends. His dramas never brought him much gain, but the stage was irresistibly fascinating to him, and it was at this time that he produced his finest works. We may mention "Volpone" (1605), the "Silent Woman" (1609), the "Alchemist" (1610), the "Tragedy of Catiline" (1611), "Bartholomew Fair" (1614), and the "Devil is an Ass" (1616). In the latter year King James conferred on him a pension of 100 marks a year, and raised it to 200 marks in 1621.

It was in 1618 that Ben Jonson took that voyage to Scotland, the home of his fathers, which has led to the famous "Conversations" of Drummond. Drummond of Hawthornden was himself a poet of no mean order, and he welcomed the great master most cordially, had much talk with him, and fortunately for the world noted it down carefully afterwards. Here we see Jonson (almost as we see another Johnson in the pages of Boswell) self-depicted and living for us after so many centuries. He returned to London the acknowledged chief of literature, to lord it in wit-combats at the "Mermaid" or the "Old Devil," or one of the other literary taverns, surrounded by younger men who revered and somewhat feared him. His later work is, however, not comparable to his earlier, except the unfinished pastoral drama, the "Sad Shepherd." His poems other than dramatic are extremely beautiful, and are all of them polished in the highest degree—perhaps sometimes a thought over-polished, for Ben Jonson occasionally committed the grave mistake of letting his readers see how learned he was. James I. desired to knight him, but he refused; Charles I. increased his pension to £100 with an annual tierce of canary, which the poet was glad to accept. He died 1637 and was buried in Westminster Abbey, the place of his grave marked by the simple words *O rare Ben Jonson*.

JOPPA, often termed *Jaffa*, was an important seaport of Palestine, and as Yafa, under the Turkish government, the seat of a lieutenant-governor, is situated on the coast of Syria 32 miles north-west of Jerusalem. It has a trade in agricultural produce, fruit, and soap, and a German colony is established in its vicinity. Tradition assigns to Joppa an exceedingly ancient date. Joshua

defined the possessions of the tribe of Dan as including "the border before Joppa" (Josh. xix. 46). It is stated by Pliny ("Hist. Nat.," ix. 5) to be the place where Andromeda was exposed to the sea monster from which she was rescued by Perseus. In A.D. 66, during the Jewish wars, it was repeatedly taken, and finally all but destroyed; and during the Crusades it was so entirely ruined by Saladin that it had scarcely any buildings left, except its two castles. It was soon afterwards repaired by Louis IX. of France. In 1799 it was taken by Napoleon, after an obstinate and murderous siege. On this occasion Napoleon put to the sword about 1200 Turks who had formed part of the garrison of El Arish.

JOR'DAN the ("swift flowing"), a river of Syria famous in biblical annals, dividing Palestine from the Hauran. It has several main sources on the south-west slopes of the Anti-Lebanon. The most northern is 2 miles north of Hasbeiya, on the west side of the mountain, where is the source of the Hasbany, 2500 feet above the sea-level.

Another source lower down the valley is at the south-west base of the mound Tel-el-Kadi ("of the Judge"), which is 38 feet above the plain, 330 paces long, and 270 broad, considered to be the site of the ancient city of Dan, called Laish at first. From the west and south-west sides of this mound two powerful streams issue, the south-west one being the largest and of greater volume than the Hasbany, with which the joint streams soon unite. A little to the south of these is another copious source at the foot of the lofty castle hill of Banias. The mountain here ends in a steep cliff of limestone, the base of which is mingled with blocks of basalt, the fallen masses having nearly obliterated a large cavern which once existed here. From among these loose blocks issues a copious stream, forming one of the chief sources of the river. But the largest of all the sources is that from the south-west side of the Tel-el-Kadi. At Sheikh Yusef, $4\frac{1}{2}$ miles south of the Tel-el-Kadi, all the streams have become united, and the river attained its full size; the channel is here from 12 to



The Jordan.

20 feet below the level of the plain, and 90 feet wide, the stream itself only 45 feet wide. It is soon after received into the Bahr-el-Huleh, or Lake of Merom, or into the marshes around it, which render the lake itself difficult of access. From Lake Huleh it flows south into the Sea of Tiberias, or Tabariyeh, as it is now called. Issuing from this lake, it flows nearly due south, and falls into the north part of the Dead Sea by two mouths. It receives two tributaries of importance, both on the east, the Yarmuk and the Zerka. It is rapid and muddy, nearly dry in summer, and subject to inundations in winter. The river has a direct course of 135 miles from its source to its mouth, from the Sea of Tiberias 61 miles; but from the numerous short bends which it makes, the length of the course is increased to 200 miles, and hence the average fall is diminished. From the foot of Hermon to Huleh it falls 1434 feet, thence to Tiberias 897 feet, and from Tiberias to the Dead Sea 667 feet; in all, 2998 feet in 200 miles, or nearly 15 feet per mile. The general rate of the current is 2 to 5 miles per hour, exclusive of rapids. Through twenty-seven of these the American expedition, under Captain Lynch, descended in boats at considerable risk. In this way the

Jordan accomplishes its extraordinary descent to the bottom of its depressed basin, 1298 feet below the level of the Mediterranean Sea. It flows between steep wooded banks, the upper surface forming a terrace, across which the waters range during "the swellings." About 500 feet above this is a second terrace on either side, and westwards there are traces of several higher escarpments. The edges of the terrace are in many places cut up by the rains and swollen torrents, entering laterally, into isolated conical mounds. The swellings or high floods take place in early summer, on the melting of the snows in Lebanon, and again after the rains in October and November. The entire depressed valley is called El Ghor by the Arabs; by the Hebrews it was named Yarden, or the descent. These terraces, and others in the valley of the Jordan, are no doubt due to the erosion of the waters during a long period, when the levels were different, as the highest are above any possible present levels of the stream when in greatest flood.

JOR'DAENS, JACOB, was born at Antwerp in 1594. He studied under Adam van Noort, and also received instructions from Rubens, and frequently worked with him on large pictures. His pictures are distinguished by power-

ful, brilliant, and harmonious colouring, as well as knowledge of chiaroscuro; but he is deficient in elegance and taste; he copied nature as he found it. He died in 1678, aged eighty-four. His works are very numerous.

JOSAPHAT, ST., see **BARLAAM**. Under this title Buddha holds a place as a saint of the Roman Catholic Church. Probably the name comes through *Bodhisattva*, an epithet of Buddha, corrupted into Greek as *Iosaph*, and into Latin as *Josaphat*.

JOSEPH, the founder of the most powerful tribe of ancient Israel, viz., Ephraim, and also of another of lesser importance, Manasseh. Ephraim occupied the centre of the land, and an account of its boundaries is given in the Book of Joshua (xvi. 1-10). The two tribes occupied a space of territory measuring about 55 miles from east to west by 70 from north to south, and the situation of the land occupied by "the house of Joseph" combined both strength and fertility. It was this that enabled it to take the lead after the disruption of the kingdom, and it became the principal power in northern Israel. The story of the founder, recorded in Genesis xxxvii. to l., belongs to the earliest portion of the Pentateuch, and it includes portions of both the Jchovistic and Elohistie narratives. It seems quite certain that Joseph arrived in Egypt under the Hyksos or shepherd kings (probably about 1806 B.C.), which accounts for his insistence with the Pharaoh of the time upon the shepherd-life of his people as a recommendation. The Pharaoh was Sutepepe Nubti, the last king but one of the sixteenth dynasty, and last of the Hyksos. The date of the Exodus and the name of Pharaoh of the oppression are not yet determined. Many Egyptologists seek to fasten the charge upon Ramses II. (the Great), but it is apart from his great character, and is put forward on slender evidences.

JOSEPH I., Emperor of Germany, succeeded his father Leopold I. in 1705. He inherited the War of the Spanish Succession, and the allied armies under Prince Eugène and Marlborough were prosperous in his reign. The battles of Ramilies, Oudenarde, and Malplaquet, the deliverance of Turin by Prince Eugène, the surrender of Naples to the Austrians, and the permanent footing obtained by the Archduke Charles in Spain, seemed to have nearly decided the question, when Joseph died of the small-pox in April, 1711, leaving his brother Charles VI., the last male heir of the house of Hapsburg, to conclude the war.

JOSEPH II., eldest son of Maria Theresa and of Francis of Lorraine, was elected king of the Romans in 1764, and in the following year, on the death of his father, he became emperor. During the lifetime of his vigorous mother, he had, however, very little authority in her hereditary domains. Joseph joined Frederick the Great and Catharine in the infamous measure called the first partition of Poland in 1772, whereby, without any just quarrel, a large part of that country was shared between the three plunderers. Joseph's share was Eastern Galicia. Joseph joined Catharine of Russia in a war against Turkey, which his general, Laudon, carried on with success, taking Belgrade and other fortresses in 1789. But while the emperor was away with the troops, discontent grew up in Hungary and in the Netherlands, which still remained a part of the Austrian dominions. At length the latter openly rebelled, and on the 22nd October, 1789, set up an independent government at Breda, while the nobles rose in Hungary. The reforms which Joseph had so freely introduced went for naught among the people, who were far from appreciating or even understanding them. Joseph was forced to undo practically all that he had done, and this basely ungrateful return for his benevolence, together with much injury received to his health during his Turkish campaign, broke his heart. He died 20th February, 1790, and was succeeded as emperor by his brother Peter Leopold.

Joseph was out of place as emperor. He was a daring

reformer and an ardent philanthropist. Long under the tutelage of the most astute princess of the time, his mother Maria Theresa, he had observed closely the evils of the social body, and had determined upon remedies for them. On his mother's death in 1780, he at once began to put these remedies into force. Disgusted with the supine lives of the clergy and the immorality of the convents, he suppressed 424 of these last, reformed the parish clergy, and proclaimed toleration for all creeds. Pope Pius VI., much alarmed, hastened in person to Vienna; but although the people were shocked by his sweeping changes, the good emperor had a spice of obstinacy in his composition, and neither for pope nor people would he modify his schemes. Successful, as he fondly deemed, with the church, he turned his hand to the nobility, protected by most shamefully unfair privileges at the expense of the nation at large. He tried also to reorganize the administration and suppress the numerous sinecures and other fat livings held exclusively by the nobility; and he introduced a uniform system of government throughout all the Austrian dominions.

If Joseph II. had been a little less hasty he would have effected far more; benevolent and right-minded as he was he lacked the necessary firmness to force his decisions on an unwilling people, or the necessary patience to train his people gradually to the acceptance of reforms. But comparing him with other princes, for instance with his sister the Queen of France (Marie Antoinette), we are struck with the remarkable freedom, goodness, and originality of Joseph's mind; and he is honoured more by posterity than he was in his lifetime. The honourable friendship of the emperor with the composers Haydn and Mozart is a characteristic trait of him.

JOSEPH BONAPARTE, King of Naples and afterwards of Spain. See **BONAPARTE**.

JOSÉPHINE, THE EMPRESS, first wife of Napoleon Bonaparte, was a native of the island of Martinique in the West Indies. Her father, Joseph Tascher de la Pagerie, a Creole, was a lieutenant in the French service. Marie Rose Joseph Tascher de la Pagerie, usually called Joséphine, was born at Trois Ilets in Martinique in 1763, and educated at a convent there, if education is the name for such an imperfect bringing-up. The family of the Vicomte Alexandre de Beauharnais, son of the sometime governor of Martinique, were so taken with the beautiful ignorant child of fifteen that they sent her to France to marry him (1779). But though Joséphine was amiability itself, and extremely clever by nature in spite of her defective education, her husband could not agree with her. When her son Eugène was born the quarrel rose to a great height, and Madame de Beauharnais suffered cruel accusations at the hands of her husband, accusations which grew to such a pitch by the time of the birth of her daughter Hortense that the vicomte applied to the parliament for a separation. His application was refused. However, Joséphine returned to her parents in 1788. Beauharnais had become a member of the Constituent Assembly, and in 1790 he wrote for his wife to rejoin him. In that time of universal suspicion he fell a victim, and was executed by order of the National Convention. Joséphine now fell into great difficulties, but the deputy Barras was very good to her, and was recognized as the protector of the lovely and unfortunate lady. When Napoleon Bonaparte had been, at Barras's suggestion, called to disarm the revolted sections on the 13th Vendémiaire (5th October, 1795), and thus had become the foremost man of the republic, he was accosted by a lad of ten or twelve, who asked the great general to deliver to him the sword of his father who had perished on the scaffold. The general, touched by his tears, gave him the sword, and received a visit of thanks from Madame de Beauharnais the next day. She had now surmounted her difficulties, was receiving help from Martinique, was at her very loveliest, and moved in the best

society which Paris afforded. Bonaparte fell violently in love with her, though he was six years her junior. Barras, far from pleading previous rights, assisted his suit, and although everyone advised her against the mésalliance, for Bonaparte was miserably poor, and his transcendent abilities were quite unknown, except to a few professional friends, she consented to marry him in 1796. Napoleon on one occasion, shortly before the marriage, overheard the notary of Madame de Beauharnais caution her against marrying a man who had "but his cloak and his sword." He never mentioned this circumstance, but in 1804, on the day of his coronation as emperor, he had this notary sent for and asked, as he stood ready robed, what he now thought of his "cloak and his sword?"—to the intense amazement, not unmingled with terror, of both the notary and Joséphine. But at the time the advantages were all on the general's side. He made himself out a year older than the truth upon the marriage certificate, and Joséphine deducted four years from her age. He left for Italy almost at once; but his wife joined him and shared the famous campaign with him, and after Marengo she played the queen in truly regal style at the little court held at Montebello. She was of the greatest service by her sweet manners and graceful dignity in winning adherents to her husband's cause. At a later period, while he was away in Egypt, she lived so unrestricted a life of gaiety that exaggerated reports reached Napoleon (chiefly malicious inventions of his own brothers and sisters), and he returned to France in the worst possible mood. Some friend of Joséphine's warned her, and she hurried to meet him, to be the first to engage his ear. Unfortunately she took one route across France and her husband another, so that they missed, and all the rancour of the Bonaparte family had full play. It was only after an affecting scene between the children of Joséphine and Napoleon that he consented again to receive her. Now followed the consulate, then the consulate for life, and a never-ending round of state ceremonials, rudely brushed aside by Napoleon but falling upon Joséphine to bear, had to be arranged and carried out. She played her part to perfection, but her extravagance in dress was very great. Many quarrels on this subject arose, more still upon Napoleon's repeated and cynical infidelities, her own house even being not respected, and worse quarrels than all upon Joséphine's childlessness, so far as her second marriage was concerned. She began to be very unhappy. The Bonapartes plied their brother with infamous accusations and fanned every quarrel, and the day of the coronation of her husband as emperor was the wretchedest day of her life. She felt her fate approaching. Loving her husband tenderly, and beloved by all save him, her son looked on with suspicion, her daughter (the Queen of Holland, and mother of him who became afterwards Napoleon III.), whom she had married to a Bonaparte in the vain hope of gaining a friend in that serried row of enemies, turning out through her open rupture with Louis a danger, not a solace; her grandchildren, whom Napoleon was prepared to adopt, dying one after the other, the unhappy empress waited only the moment of the tyrant's decree. He signified it in his usual brutal manner by leaving her unattended at her entry to a public ball. The divorce was civilly proclaimed by the emperor's government, for the Pope resolutely refused to grant an ecclesiastical divorce (1809). Napoleon married the Archduchess Marie Louise of Austria. Joséphine retired lamented by everyone to Malmaison, an estate she had purchased during the consulate. She just lived long enough to know of Napoleon's banishment to Elba in April, 1814, and consulted her friends as to whether, now that *l'autre* (the Empress Marie Louise) had abandoned him, she might not visit him there. But she was already sinking into the illness which was to carry her off, and she died in the following month. She had many faults, but they were far outweighed by her virtues; and the works of

Madame de Rémusat ("Memoirs," 1880), her chief lady, and of Bourrienne, Napoleon's confidential secretary, who knew her more intimately than anyone, set her forth in the most amiable light. When a young woman she was exquisitely lovely, but she lost the whiteness of her teeth as she got older, and her smile was no longer so charming. She retained her consummate skill in dress and her unrivalled grace to the last.

JOSEPHUS, FLA'VIUS, the Jewish historian, was born at Jerusalem A.D. 37. By his mother's side he was descended from the Asmonean princes, and his father Matthias belonged to a high sacerdotal family. Josephus was brought up at Jerusalem with his brother Matthias. According to his own account he was early celebrated for his learning: and after long study and experience of the tenets of different sects, embraced those of the Pharisees. About the year 63 he went to Rome on behalf of certain priests whom Felix had sent there as prisoners on some slight pretext, and on the journey narrowly escaped shipwreck. Having obtained their release through the aid of a favourite of the Empress Poppæa he returned to Judea, where he sought to influence his countrymen in favour of peace. On the breaking out of the war, however, he acted with great vigour as a commander against the Romans, until he was taken prisoner by Vespasian, 67 A.D. after having defended the town of Jotapata to the last extremity. Instead of being put to death, as was the fate of his companions, he was received by Vespasian with honour, in consequence of his artfully predicting that Vespasian would shortly succeed Nero in the government of the Roman Empire. He was present with Titus at the siege of Jerusalem, and endeavoured to prevail upon his countrymen to submit to the Romans. On the capture of the city, Titus offered to grant him anything he wished. He asked for the sacred books and the lives of his brother and fifty friends. He received a large estate in Judea, and upon going to Rome was admitted to the privileges of a Roman citizen by Vespasian, who also gave him an annual pension and apartments in his own house. After the death of Vespasian, he continued to live in Rome in high favour with Titus and Domitian. The time of his death is uncertain: he was alive at the latter end of the first century, and probably at the beginning of the second.

The first work published by Josephus was the history of the "Jewish War;" it was originally written in the Syro-Chaldaic language for the use of those Jews who lived beyond the Euphrates. He afterwards translated it into Greek for the benefit of the learned Romans. Many years afterwards, A.D. 93, Josephus published in Greek his great work on the "Antiquities of the Jews." He also wrote "Two Books against Apion," in reply to those Greeks who questioned the truth of the early part of his work on the "Antiquities of the Jews."

The works of Josephus have been frequently translated into most of the modern languages of Europe. The recognized English translation is by Whiston.

JOSH'UA (Heb. *Yehoshua*, Jehovah helps), the name of the leader of the Israelites after the death of Moses. He was of the tribe of Ephraim, and is mentioned first in connection with the war against the Amalekites (Exod. xvii. 9). He was afterwards selected as one of the spies who were sent to explore the land of Canaan, and was appointed by Moses to succeed him in the leadership after his own death. In the capacity of leader he displayed much courage and wisdom, and after great successes gained for the Israelites a firm hold upon the land. He died at the age of 110 years, and was buried at his own inheritance of Timnath serah.

The Book of Joshua contains an account of the conquest of Canaan in one complete narrative, which extends from the commencement to the end of the twelfth chapter; an account of the division of the land among the tribes and

families of the nation, and finally describes the last days and death of Joshua himself. Nothing is known as to the authorship of this book, and opinions are greatly divided as to the date of its composition. By the rabbis and the Christian fathers the composition of the book with the exception of the closing section, was ascribed to Joshua himself. By later commentators it has been ascribed to the elders after Joshua, to Samuel, to Jeremiah, and to an unknown writer of the post-exilic period. It bears unmistakable evidence of being a compilation from some earlier records, some of which have been inserted bodily into the book, and which have all the appearance of having been written by eye-witnesses. Thus it speaks of the harlot Rahab as dwelling in Israel even unto this day (vi. 25), while in another place we read of the mountains of Judah and the mountains of Israel (xi. 21), which shows that this passage was written after the division of the nation into the two kingdoms had taken place, a period 500 years later than the time of Joshua. It is also evident that the documents termed the Elohistic and the Jehovistic have both been drawn upon for the composition of this book, and there is one incident at least for which the authority of the lost Book of Jasher is quoted (x. 12-14). The most probable theory as to the authorship of this book is that which makes it the work of several hands, an original document having been at different times redacted by different editors, and that it owes its present form to the compilers of the period subsequent to the exile.

The canonical authority of the book has never been disputed, and in all MSS. of the Old Testament it immediately follows the Pentateuch.

JOSQUIN or **JOSSE DES PRES**, or *Giusquino del Prato*, in the Italianized form of his name, a distinguished musical composer of the early Netherlands school, was born in the middle of the thirteenth century, and studied under Ockenheim or Ockeghem, at St. Martin's of Tours, in the choir of Louis XI. of France. He arrived at Rome as a member of the papal choir under Sixtus IV. (who is for ever famous by his Sistine, *i.e.* Sixtine, Chapel), and was singing and writing there in 1481 when Sixtus died. There are several of his masses in MS. in the Sistine Library of Music, but they are not at present allowed to be inspected. He was by far the most popular composer of his age, and Baini says that before Palestrina came nothing was to be heard but Josquin in any country where music was loved. At the death of Sixtus, Josquin went to Ferrara, and stayed some time with the great Duke Hercules. Thence he went to Paris, and was in great favour with Louis XII. He was a witty fellow. For instance, when the king desired to shine in music, notwithstanding his inability to sing a note in tune, Josquin accomplished his desire. The piece is still extant, the *vox regis* in it carefully confined to one note all the way through. At the close of his life Josquin took service with the Emperor Maximilian, who gave him a canonry at Condé, and here he died, according to an old copy of his epitaph, in 1521. Henry VIII. loved Josquin's music, and Anne Boleyn collected much of it, and learned it while she resided in France. Josquin is the oldest writer of whom a large quantity of his compositions has come down to us.

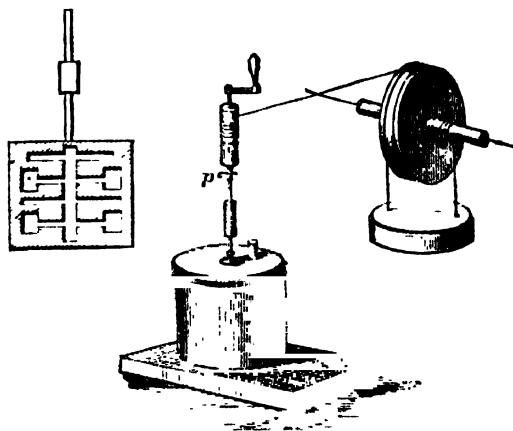
JOSS STICKS are small reeds covered with the dust of chloriferous woods and burned before idols in China.

JO'TA (pronounced *chota*, the *ch* being guttural, as in the Scotch *loch*), a characteristic dance of Northern Spain. It resembles the waltz distantly, but is far more vigorous and free, and gives opportunity for invention of new steps as the dance progresses. Each province has its traditional variation of the jota both in tune and in dance. The jota of Aragon is considered the best. It is danced in pairs, and the clatter of castanets, the snapping of fingers, and the clapping of hands are held desirable as accompaniments to the guitar and the simple vocal refrains which form the instrumental accompaniment of the dance.

JOUGS, an instrument of punishment formerly in use in Scotland and in some parts of the Continent. The jugs, called also *juggs* or *goggs*, consisted of an iron ring or collar fastened to a wall or post by several iron links. The collar opened by a hinge, and the culprit's neck was secured in it by means of a staple and padlock. This form of punishment was in use for civil and ecclesiastical offences. Though the use of this instrument has for a century been discontinued, it may still be seen in some few country parishes of Scotland hanging to the churchyard walls.

JOULE, one of the electric elements, named in the modern fashion after a distinguished physicist. The *joule* is the heat-element of electricity, and one *joule* represents the amount of heat generated by one *watt* (*i.e.* $\frac{1}{746}$ of a horse-power) in a second; or in a strictly electrical way, a *joule* may be defined as the quantity of heat generated by an *ampère* flowing through an *ohm* for one second. The *joule*, the *watt*, the *weber* (unit of pole) and the *gauss* (unit of field) are terms due to Dr. Siemens when president of the British Association in 1882.

JOULE'S EQUIVALENT. It has always been difficult to measure heat-power. The amount of heat absorbed by a body is not measured accurately by its tem-



perature, as at certain points heat goes to store up energy in the body (latent heat, &c.), and does not manifest itself by a rise in temperature, yet whatever heat is absorbed by a body will be under suitable conditions given up again by that body, and can therefore be made to do work. The question remained, how much work?

The experiments of Joule were carried on from 1842 to 1849. The apparatus employed is shown in the accompanying sketch. It consists of two principal portions, a box containing water, in which a paddle, by means of its rotation, produces an increase of temperature through the friction of its solid particles against the fluid particles of the water, and an arrangement by which a descending weight produces a rapid motion which is transferred to the rotation of the paddle, and thus manifested as heat. There are eight sets of paddles revolving between four stationary vanes, thus preventing the whirling of the liquid. The peg, *p*, is withdrawn when it is wished to wind up the weight without moving the paddles. The heat produced in the axles of the pulleys is allowed for. A thermometer gives the temperature of the water. The radiation and conduction of heat are prevented as far as possible, and measured when existing, and the heat-equivalent of the work is thus deduced as being 772 foot-pounds of energy required to raise the temperature of 1 lb. of water 1° Fahr., or, what is the same thing, 1390 foot-pounds to raise it 1° C. This is equivalent to 424 kilogrammetres required to raise 1 kilogramme of water 1° C., the French unit of heat.

The above is the value of the mechanical equivalent of heat usually accepted in this country, and known as Joule's equivalent; it is not, however, so universally accepted on the Continent, where some recent deductions have made it somewhat larger. In formulæ of thermodynamics j therefore stands for 772 (or 1390). If we take the gramme-degree-centigrade for our unit of heat, and the gramme-centimetre for our unit of work, then the value of j will be 42,400. If we take the gramme-degree and erg as our units then the value of j is given in the C.G.S. system; this value is of course 981 times 42,400, or 41.6 millions. The first law of thermo-dynamics is that the work equals the degree of heat multiplied by Joule's equivalent, *i.e.* the well-known formula $w = JH$.

JOURDAN, MARSHAL, a soldier of fortune in the French army, and one of Napoleon's favourite generals, was born at Limoges, 29th April, 1762. He first entered the army as a private soldier in 1778, became a chef-de-bataillon in 1791, and soon rose to be general of division. In this position he successfully commanded the armies of Ardennes, the North Moselle, the Sambre and Meuse, the Danube and Italy, and was present at the battles of Wattignies, Arlon, the capture of Charleroi, the battles of Fleurus and Aldenhoven, the capture of Brussels, Namur, Louvain, Liège, Cologne, Frankfurt, the passage of the Rhine, &c. He was governor of Naples in 1806, having been previously created a marshal of the empire. In 1811 he was governor of Madrid and major-general to the King of Spain, Joseph Bonaparte, with whom he sustained a terrible defeat at Vittoria by the allied troops under the Marquis of Wellington. After this he retired from active military duty, and remained so with little interval until the restoration of the Bourbons, when he became a count and a peer of France, general-in-chief of the army of the Rhine, governor of the Invalides, &c. He died in 1833.

JOUSTS. See Jousts.

JUAN, DON. See GIOVANNI, DON.

JUAN FERNANDEZ, ISLAND OF. See FERNANDEZ, ISLAND OF.

JUAREZ, BENITO PABLO, President of the Republic of Mexico, was a full-blooded Mexican of the Indian nation of the Tlaxtecos. He was born near Oaxaca in 1806. He studied profoundly at the institute of arts and sciences as a young man, was a member of the legislature at twenty-eight years of age, and professor of canon law at twenty-nine at Oaxaca. He rose rapidly as soon as he adopted a political career. He was governor of Oaxaca from 1817 to 1852, and was considered of such dangerous importance as to be banished by Santa Anna in 1853, when the new constitution was proclaimed. In 1855 he assisted in the insurrection of Alvarez, whom he served as minister of justice and foreign affairs in the new government, and reached at last the presidency in 1858. He was unable to hold his power against Zuloaga and the church party in the civil war which now raged, and retired to Vera Cruz at the beginning of 1859, Miramon being recognized as president in succession to Zuloaga by the European powers; but in the following April Juarez was recognized as president by the United States. Miramon besieged him in Vera Cruz in March, 1860, but was totally defeated by him in the following August at Yalalapa, and retreated to the city of Mexico. Juarez again defeated Miramon at San Miguelito, and drove him out of the country. Miramon escaped to Spain, and Juarez entered the city of Mexico, 1861. He was re-elected president in June, 1861, and at once decreed the suppression of religious orders and the resumption of their property by the state, further declaring a suspension of state-payments for the time. This brought about a convention between England, France, and Spain for a combined intervention in the interests of the European creditors of Mexico (London, October, 1861), and the Spanish forces arrived in December, the British and

French in January, 1862. The chief places were occupied, and Juarez began negotiations. Suddenly the French refused to negotiate with him, whereupon the British and Spanish withdrew, and France declared war on her own account, April, 1862. In July, 1863, the country was sufficiently under French domination for the Empire of Mexico to be proclaimed, and the unhappy Maximilian, archduke of Austria, was the sovereign selected. The ex-president Miramon came back to Mexico with Maximilian, and served him in various capacities. Juarez gallantly contested the country, but had to give up the struggle, and for a long time was in hiding. The French, pressed by European complications, withdrew in 1866, and Maximilian's power fell at once. Juarez reappeared, Mexico was besieged, Lopez delivered the unhappy emperor into his hands, and Maximilian and Miramon were shot by the orders of Juarez at Queretaro in June, 1867. In the next month Juarez entered Mexico in triumph, and as his term of office had expired he was at once again elected president of the restored republic. He retained the presidency till his death in July, 1872.

JUBBULPORE. See JABALPUR.

JUBILEE, THE YEAR OF. According to the provisions of the Levitical law of the Jews, every seventh year was sabbatic, and during the year the land was to remain untilled and its fruits ungathered, except by the poor, though hunting, building, pastoral and commercial duties might be pursued as usual. When seven times seven years had been counted, the next or fiftieth year was to be a year of liberty, and in addition to the cessation of agricultural labour all Hebrew slaves were to receive their freedom, though foreign slaves were to remain bound for ever. All the land sold during the preceding fifty years was to be returned to the sellers with certain exceptions, defined Lev. xxv. 32-34, and mortgaged lands were to be returned without charge. Houses in walled cities were exempted from the provisions of this law, and when sold, if not redeemed within one year, they became the permanent property of the purchaser. The design of the law seems to have been to preserve something like equality in the outward circumstances of the people, and to prevent undue acquisition of the land on the part of the wealthy. According to Josephus debts were remitted when the year of jubilee came, but this is not mentioned in the Old Testament. No trace can be found in Hebrew history of this law having ever been observed in practice up to the time of the exile, and after that event the Pharisees and rabbins are agreed that though the jubilee years were calculated the provisions of the law were not observed. Philologists are not agreed as to the meaning of the term jubilee, but the opinion most generally received derives it from Heb. *yobel*, a joyful blast from the trumpet or ram's horn.

In the Roman Catholic Church the year of jubilee is a festival held every twenty-five years, and reckoned from Christmas to Christmas. The first institution of this year dates from 1300, when Pope Boniface VIII. published a bull in which the plenary indulgence previously granted only to those who went on crusade was extended to all those who during a centennial year should go on pilgrimage to Rome, and while there devoutly confess and repent of their sins, and visit fifteen times the churches of St. Peter and St. Paul. Residents at Rome could obtain the same privilege by paying thirty visits during the same period. The invitation of the Pope was accepted with wonderful enthusiasm, and it is said about 2,000,000 persons visited Rome during that year. It had been originally designed to observe the jubilee only once in a century, but Clement VI. reduced the period to fifty years and held it in 1350. Urban VI. commanded another jubilee in 1389, on a curious calculation which based itself upon the inclusion of thirty-three years, the

length of the life of the Saviour upon earth, and this jubilee was held by Boniface IX. (Urban having died) in 1390. Nicholas V. again restored it to the even fifty years in 1450; and finally in 1470 (preparing for 1475) Paul II. fixed it at twenty-five years. It has been punctually observed at each recurring period with the exception of the year 1800, the last jubilee being observed in 1875. In the later observances of the jubilee, the pilgrimage to Rome has been dispensed with, and the privileges of the year have been awarded to the faithful on the performance of certain specified works at home. In addition to the ordinary jubilee the Pope has the power to appoint an extraordinary festival of this kind whenever the necessities of the church may render such a course beneficial.

JU'DAH, JUDE'A. See JEWS; PALESTINE.

JU'DAISM. See JEWS.

JU'DAS MACCABÆ'US. See MACCABEES.

JU'DAS TREE (*Cercis Siliquastrum*) is a tree so called from a tradition that it was upon a plant of it that Judas hanged himself. It is common in the south of Europe and the East. It belongs to the order LIGU-MINOSÆ, and is readily distinguished by its simple glabrous, kidney-shaped leaves, and from the flowers of a bright pale red appearing before the leaves, which are bluish-green above and sea-green on the under surface. It is hardy in England, and will flower well if grown against a wall or in a sheltered position. It is a low tree with a flat spreading head. The wood is beautifully veined, and takes a good polish. The flower-buds are pickled in vinegar, and the flowers are mixed with salad.

JUDE, THE EPISTLE OF, one of the smallest and most controverted of the books of the New Testament. It professes to be written by a brother of James, and some commentators have identified the author with the apostle Judas Lebbaeus or Thaddæus. The writer, however, in verse 17 seems to distinguish himself from the apostles, and the most probable opinion is that which makes him one of the "brethren of Jesus" (Acts i. 14), and the brother of James the bishop of Jerusalem. The references in the book show that it was designed for the use of Jewish Christians, and it quotes from two apocryphal books, the "Assumption of Moses," and the "Book of Enoch." It was one of the books marked doubtful by the fathers, and the first allusion to it is found in the writings of Clemens Alexandrinus (165-220). It is included, however, in the canon of Muratori, the date of which is assigned to the year 170 A.D., and it was accepted as canonical by the council of Laodicea, 363 A.D. Since the Reformation doubts as to its canonicity have been expressed by several eminent commentators, among whom Grotius, Luther, Calvin, and Michaelis may be mentioned, but it has been defended by many others. The object of the writer seems to be identical with that of the author of the Second Epistle of Peter, and the larger portion of the Epistle of Jude (verse 3-16) corresponds very nearly both in language and subject with 2 Peter ii. 1-19.

JUDGE (from the French *juge*, which is from the Latin *judex*). A judge in England and Wales is a man who presides in a court duly constituted, declares the law in all matters that are tried before him, and pronounces sentence or judgment according to law. Some judges are called recorders, and there are other names, but the name does not alter the nature of the office. When the judges simply are spoken of, the judges of the Supreme Court of Justice are meant. The judges are appointed by the crown. They hold their office during good behaviour, and notwithstanding the demise of the crown. They can be removed by the crown on the address of both houses of Parliament. Retiring pensions are given to the judges under various Acts of Parliament. The highest retiring pension is £5000, which may be granted by the crown to the lord-chancellor upon his resignation. Judges are not liable to prosecution

for anything done by them as judges, but they may be prosecuted in Parliament. Nor are they liable to an action for any error in judgment or for wrongful imprisonment, at least when they are acting within their jurisdiction. Judges are punishable for bribery by loss of office, fine, and imprisonment. The powers and duties of judges would form the subject of an elaborate treatise. Without undue boasting it may be safely asserted that the English bench of judges is the most learned, dignified, and honourable company of state officials in existence.

In Scotland the term judge is properly applied to those who sit in the supreme civil and criminal courts; but it may also be applied to those sitting in inferior courts, such as sheriffs, magistrates of burghs, &c. The judges of the supreme courts and sheriffs are appointed by the crown, and the rules as to their tenure of office and removal therefrom are the same as in the case of the English judges.

JUDGE-ADVOCATE, in military matters, an important functionary, appointed to officiate as public prosecutor on every general court-martial formed for the trial of officers and soldiers accused of a breach of the Articles of War. There are different kinds of judges-advocate, as the judge-advocate-general, who is appointed under the sign-manual; the judge-advocate deputed by commission from the crown; the deputy judge-advocate, acting under the authority of the judge-advocate-general; and the officiating judge-advocate, who is appointed by commanding officers abroad. The judge-advocate of the forces stationed in London is regarded as a civil officer, and allowed a salary from the civil department. The office is generally held by an experienced barrister in the confidence of the crown. The duties of a judge-advocate are to register and record all the acts of a court-martial, and all the evidence, as nearly as practicable in the exact words of the witnesses; to advise the court on points of law, of custom, and of form; and to call their attention to any deviation from the strict rules of order. It is also his duty to note down the opinion of each member of the court-martial as he delivers it, whether for or against the prisoner; but he is bound not to disclose the vote or opinion of any particular member.

JUDGE-ADVOCATE-GENERAL is the supreme judge in the administration of martial law. He is also the legal adviser of the commander-in-chief and the secretary of state for war. The salary is £2000 a year, and the holder of the office must be a member of the House of Commons and of the ministry. The deputy judge-advocate-general is an officer holding a temporary commission as public prosecutor in every court-martial, at a salary of £1000.

JUDGES, the title of a canonical book of the Old Testament which gives an account of the history of the Israelites from the death of Joshua to that of Samson. The events of the history are grouped round six of the heroes (*i.e.* *Shophetim*, in Hebrew, a word similar to the term used to designate the Phœnician dictators, who were styled *Suffetes*), who at different periods were raised up to deliver the people from oppression. There are two introductions to the book (chap. i. 1 and chap. ii. 6), and then follows an account of a series of revolts on the part of the people against Jehovah, his chastisement of their rebellion, and their subsequent return and deliverance. These extend to the end of the fifteenth chapter, and the closing section of the book is made up of the two separate stories of Micah and the Danites, and the Levite and the tribe of Benjamin. With regard to the authorship of this book nothing is known, and there are but few passages in it from which the date of its composition may be inferred. The use of the phrase "unto this day" (chap. xv. 19) implies a period distant from the time of Samson, while references such as chap. xvii. 6 show that the writer lived either during the period of the monarchy or subsequent to it. If the phrase "until the day of the captivity of the

land" (chap. xviii. 30) be taken to refer to the exile, the final redaction of the book must be placed after that event. Whatever date is assigned, however, to the final composition or shaping of this book, it is evident that the sources of its narrative are derived from some of the most ancient traditions and records preserved by the nation. These records, fragmentary and imperfect though they may be, are yet of the highest value to students of Jewish history, and they afford glimpses of the earlier condition of the nation which can be found in no other part of the Old Testament.

In the study of this book it must be remembered that it is not, properly speaking, a connected history, but rather a collection of historical traditions grouped together with a religious purpose, by one who lived at a period much later than the events he uses for his book. The chronology of this book when compared with that of the Book of Kings presents unusual difficulties in the way of reconciliation. The sum of the dates given reaches 410 years, and the 450 years referred to by Paul (Acts xiii. 20) is obtained by adding forty years for Eli, who comes after Samson, but in the First Book of Kings (vi. 1) 480 years only is allowed for the time between the exodus and the foundation of the temple. Several arbitrary methods of reconciling the figures have been adopted by commentators, generally proceeding on the supposition that the narratives in the Book of Judges only refer to parts of the country, and that some of the leaders there mentioned may have been contemporaries. The canonical authority of this book has never been disputed. In the Hebrew MSS. it is placed as in the Authorized Version, immediately after the Book of Joshua. Its histories are referred to in the New Testament by the writer of the Epistle to the Hebrews (xi. 32).

JUDGE'S CHAMBERS, an office attached to the Queen's Bench division of the High Court of Justice, where the judge, assisted by masters, hears applications in his room relative to the preliminaries of cases maturing for trial. It is also used for summary trial in cases of interpleader where the amount is under £50.

In Scotland the bill-chamber discharges similar functions.

JUDGMENT, in law, is the sentence pronounced by the court upon the matter in the record, and the remedy prescribed by law for the redress or punishment of injuries, the suit or prosecution being the vehicle by which the injury is brought before the court. Judgments are given under four heads of issues: on demurrer, where the facts are admitted by the parties, and the law determined by the court; on verdict, where the law is admitted and the fact disputed; by confession or default, where the defendant admits both the law and the fact; and on nonsuit or retraxit, where the plaintiff is made to acknowledge that neither the law nor the facts are sufficient to support his case, and therefore has to abandon the prosecution.

Judgments are either interlocutory or final. Interlocutory judgments include all those which are given on account of the incomplete state of the case as brought before the court, and which do not go to the absolute merits of the case: such as judgments on pleas of abatement. But the largest class to which this term is applied are judgments which decide the right between the parties, but require some other proceeding to determine the amount to be recovered. This proceeding is commonly a writ of inquiry, directed to the sheriff, who impanels a jury, and proceeds to assess the amount of damages to which the party in whose favour the interlocutory judgment has been given is entitled. If, however, the suit is for a specific thing or sum, and the decision of the court determines whether the plaintiff is or is not entitled to recover the remedy he sues for, the judgment is final.

The late Acts affecting judgments are the 18 & 19 Vict. c. 15, the 23 & 24 Vict. c. 38, and 23 & 24 Vict. c. 115; and the Act which came into operation on the 29th July, 1865,

provided that no judgment (including registered decrees, orders of courts of equity, bankruptcy, and other orders, having the operation of a judgment), statute, or recognizance shall affect any land of whatever tenure until such land shall have been delivered in execution in pursuance of such judgment, &c.; and that every such execution shall be registered in the name of the debtor instead of in the name of the creditor; and every creditor to whom the land has been delivered in execution shall be entitled to an order of the Chancery division, to be obtained in a summary manner, for the sale of the debtor's interest in such land; and any other creditors with a charge on such land shall be served with notice of the order for sale, and the proceeds of such sale shall be distributed among the persons entitled thereto according to their respective priorities. This is a most important amendment in the law of judgments, and will lessen much the difficult questions which have often arisen between a purchaser of land and a judgment creditor. Still the questions that arise are intricate, and it would be difficult even in an elaborate treatise to say exactly what is the effect of the different Acts referred to.

In criminal proceedings, after trial the defendant can move in arrest of judgment at any time before judgment is pronounced; but this can only be done upon error appearing on the face of the record, and no motion of this sort can be made in the defendant's absence, unless a verdict is found in which the jury reserve a point for the consideration of the court. After the judgment is recorded, a writ of error is necessary before it can either be reversed or altered. Formerly no judgment affecting the liberty of the individual could be pronounced in his absence; but this has been altered by the 11 Geo. IV. & 1 Will. IV. c. 70, which enacts that, upon trials for felonies or misdemeanours, judgment may be pronounced whether the person affected be present or absent, except only in such cases of information filed by leave of the court, or in cases of information filed by the attorney general where he prays that judgment may be postponed. The judgment of the court extends to the life and liberty of the offender, according to the punishment decreed to the offence against which the judgment is delivered. In some cases it extends to the compensation by forfeiture of the lands or goods, or both, of the offender; others induce a disability of holding offices or fix a lasting stigma on the offender; and a large proportion are merely pecuniary by stated or discretionary fines.

In Scotland all judgments may be brought under the review of a superior court, except those pronounced by the Court of Justiciary, or unless it is otherwise provided by statute.

JUDGMENT, in philosophy, is one of the great operations of the intellect. The mind having formed concepts proceeds to decide whether a given case comes under the concept. Thus having the concept of red we judge that a stone is red. When we compare judgments and involve other judgments from them we reason.

Judgment is therefore the operation of the mind by which it produces a statement or proposition, and a statement is always composed of a general notion (predicate) and a particular instance (subject); such as the statement, "This stone (subject) is red (predicate)." True judgments are therefore synthetical since they connect two concepts together; but there is a class of statements which are only judgments in verbal form, as when part of the concept is set out for some logical reason, and these are analytical, not synthetical. If instead of saying "this stone is red" we had said "this stone is heavy," we should have given an analytical judgment, that is no (true) judgment at all, for heaviness is merely a part of our complex concept "a stone." Judgments are in their essence affirmative; that is, we state a connection to exist or not to exist between subject and predicate, and since either one or the other

case must be true we have in making judgments to choose between two statements. We must either feel that "this stone is red" or that "this stone is not red" when our attention is called to its colour; that is, even in making the simple statement that it is red, we have *ipso facto* judged, and excluded all other colours. But here comes in a state between rigid affirmation and negation; and this state of indecision is called *belief* when it inclines to the affirmative and active side, and *doubt* when it inclines to the negative and inactive side. Belief is the atmosphere of the young and healthy, doubt of the old and feeble. Negation rather than doubt is chosen by vigorous minds to whom affirmation is impossible in a given case.

Besides these half-judgments there are the indistinct judgments, given either through want of care in clearing conceptions of all ambiguity and in accurately defining the terms of the subject and predicate; or through the adoption of unproved concepts at second-hand; or through faulty observation, and consequently wrong conceptions of those terms; or through passion warping the mind and giving it coloured or distorted glasses through which to observe, so that all the care and clearness and truth of observation possible shall but bring about a worse judgment from the very good faith with which it was made; or finally, from error in the judgment itself—though this, which at first sight would seem to be the most likely cause of error, is really not nearly so prolific of error as either of the others named.

It is in the common observation of everyone that a very large proportion of our judgments are instantaneous. Some philosophers even contend that a large class of them are innate. [See *FORA*.] But what is undoubted is that a vast number are inherited, not perhaps actually formed, but rather in the guise of tendencies which it takes but the nudge-touch to crystallize into definite shapes, as crystals are formed in a saturated liquid. Thus a child of a family cultured through long generations has a tendency to recognize fine gradations in colour, sound, touch, &c., almost at their first presentation, which are imperceptible, except through long experience, to the child of duller race. Of this kind of judgments are "common sense" and all "intuitive" beliefs. Many judgments, however, involve reasoning or inference; that is, they are judgments of judgments, and these are elsewhere considered. See *RATIONATION*.

The training of the minds of children to form accurate judgments is the most important function of the educator. The fertile fancy and love of the marvellous and exaggerated must of course be allowed their fair play; but on the other hand the teacher must gradually induce the child to take care, when it pleases, to dismiss all that delightful fairy land and perceive bare plain truth. Again, the independence of judgment and unwillingness to take mere statements at second-hand which must be the object of every teacher to induce, must not be pushed to so great an extent as to cultivate a contempt for all authority. But this depends largely upon the children's nature. A timid child must be taught self-reliance, a bold child must be taught to rely more upon the judgments of others. It is necessary to have a good stout backbone if one is to be strong, but that backbone must be pliable, not rigid, if it is to fulfil its every function.

JUDGMENT OF THE GODS, in Norse mythology. See *RAGNAROK*.

JUDICATURE ACT, THE. The British system of jurisprudence, long open to the reproach of being the most costly, delicate, and intricate in the world, was to a great extent reformed and simplified by the Judicature Act of 1875. The subject was one of such perplexity that it was only in the power of really astute lawyers to devise a remedy, and lawyers, generally conservative, were naturally disinclined to remove venerable abuses whose existence

largely enhanced the profits of their profession. In the meantime unfortunate suitors were driven to despair by interminable delays and expense, and the uninterested public wondered that a system so expensive to taxpayers gave so little satisfaction to those it proposed to help.

A suitor desiring redress was first of all embarrassed by the multitude and variety of our courts of justice. When the specific one which would take cognizance of his particular case was at length discovered, it was found that the court only sat for six months out of the twelve, and that a year, perhaps years, would elapse before his turn would come, owing to arrears which must first be disposed of. When, ultimately, the case was heard, the judge in giving decision would possibly express regret that it had not been taken to some other court, as a full settlement of its merits was beyond his jurisdiction! If the question were simply whether A was entitled to recover from B £1000, or a house, or a horse, a common-law court could say "Yes" or "No." But controversies are not always so simple. A may be entitled to what he asks, but not unless he first complies with various conditions on his part; and B may have claims against A which ought in common fairness to be dealt with at the same time. And C, D, and E may be really involved in the transaction, so that without bringing them in the quarrel cannot be settled. With such cases a common-law court was absolutely powerless to deal, having no equity-jurisdiction. All the judge could do was to decide upon the strictly legal points as between A and B, or urge the parties to choose another tribunal. The suitor thus found that after all his time, trouble, and money were expended his case could not be decided at all, or that only half justice could be done him, because the court could not take cognizance of the cause in all its bearings. See *EQUITY*.

In former times the courts of law followed the king from place to place as his residence was changed, and were, moreover, pretty fully occupied with the king's business. The Great Charter provided for the establishment of a court whose locality should be fixed, and which should sit permanently and continuously to administer justice to the people. With the large accession of causes which accrued in course of time much of the business of this court overflowed into the others, which presently were also permanently located at Westminster; and the same pressure caused cases which properly belonged to an equity court to be brought into the King's Bench or Common Pleas, with the result as above pointed out, that only half justice could be done. In spite, too, of an increase in the number of judges the pressing business of assizes increased at a still greater rate, and to allow of judges going circuit the sittings of the central courts were cut down from time to time, with the natural result of large accumulations of arrears. Hence arose the various difficulties in the administration of justice, often really amounting to a denial of it entirely; so that suitors in recent years were in fact worse off than in the times of the Great Charter.

In 1867 a royal commission was appointed to consider our judicial system, and a report was presented in 1869. The commissioners called attention to the evils of our double system of common-law and equity, to our isolated courts with clashing or overlapping jurisdictions, with no power to confer with or to assist one another, no power to transfer a cause or a question from one to another, total strangers to one another, except that one could at times put an end to the proceedings of the other, and require them to be begun over again in its own forum. They then recommended that all the various courts should be consolidated into one high court of justice, sitting, it might be, in various divisions, but each division invested with *all* the jurisdiction exercised by each and all the courts so consolidated. In 1869 Lord Selborne introduced a bill founded upon this report. This bill became the Judicature Act of

1873; but its operation was postponed, and with some few modifications it ultimately became the Judicature Act of 1875.

By this Act the courts of Chancery, Queen's Bench, Common Pleas, Exchequer, Admiralty, and Probate and Divorce were united into one court as the Supreme Court of Judicature in England. The Supreme Court was divided into her Majesty's High Court of Justice and her Majesty's Court of Appeal. The latter was intended to be a final and the highest court of appeal, but by the Appellate Jurisdiction Act of 1876 the House of Lords was confirmed in its functions as the highest court of appeal, modified, however, by the appointment of special lords of appeal, in addition to the judicial personages of eminence who sit by right in the House of Lords. The lords of appeal sit in the House as peers during continuance of office only; and they, the lord chancellor, and peers of Parliament holding or having held high judicial office, may sit to hear appeals whether Parliament is in session or not. To some extent, therefore, the legislation of 1876 modified the appeal clauses of the Judicature Act of 1875.

The Court of Appeal, however, affects only a certain proportion of cases. The great interest of the Act centres in the High Court of Justice which it created, and by which the administration of justice was simplified and facilitated to a far greater extent than it had been for centuries. By this Act the various courts were converted into divisions of the one high court, each division possessing equal powers and jurisdiction, both in law and equity, taking cognizance of every kind of right, and providing the proper remedy for every wrong. It is true that particular divisions of the High Court are, under their old designations, resorted to for the despatch of particular kinds of business—each division thus continuing to have for its principal business the work for which it is best suited; and it is desirable that it should be so, but the change that was accomplished was none the less considerable and momentous. The great gain is that, whatever turn a cause or suit may take, the court before which it is is able to follow and control it. Under the old system a common-law judge was frequently heard to regret that a court of equity had not been moved to restrain a suitor at law from obtaining the decision in his favour which the common-law court was reluctantly compelled to pronounce; and, moreover, a man might have had rights fully recognized by a court sitting on one side of Westminster Hall, which were utterly ignored by a court sitting on the other. It is no slight gain to suitors, and to the credit of our judicial system, that such gross anomalies are for ever swept away by the institution of a court which, as a whole, and in each of its divisions, takes cognizance of all the various interests concerned, and enables one action to do the work which formerly required two or even many.

Distinctions between the various branches of the law itself having vanished, those which existed between the functions of proctors, attorneys, and solicitors vanished as well, and the first two names were expressly abolished.

The chief cause of delay to suitors in former times was the accumulation of arrears through the sittings of the courts being only brief and intermittent. This evil is now removed; the old terms are abolished, and the sittings are continuous with the exception of a week at Christmas, Easter, and Whit-sun-tide, and during the autumn vacation. Even during the vacation there are certain judges appointed to dispose of business which will not admit of delay. The number of judges appointed is sufficiently large to enable the High Court in its various divisions to dispose without delay of all current business that may arise.

A vast amount of cumbrous and costly technicality, in the commencement and conduct of proceedings, was also swept away by the Act, especially in chancery proceedings. All suits are now actions, and all actions commence with

a writ of summons, which states in simple language why the action is brought and what is claimed. Full provision is made for the cheap and summary disposal of the large classes of cases in which there is no substantial defence or resistance.

In the fierce heat of litigation, with the air charged with suspicion, nothing could formerly be done by consent; the most fair and reasonable proposal was received as the kiss of an enemy; and litigants often rushed with their counsel and witnesses before a judge and jury, only to be told that their case was one of hundreds which could not thus be tried, and that it must be referred to arbitration, with all the expense and delay to begin over again. By the Act the parties can at the proper stage of their cause go before a judge and obtain his decision as to how all or any of the questions in the cause shall be tried; and one of the most striking features of the new procedure is the variety of methods of trial permitted. Cases may be tried before a judge or judges, or before a judge sitting with assessors, or before a judge and jury, or before an official or special referee, with or without assessors.

The rules of procedure under the Act are very important, and in their clearness, consecutiveness, and simplicity of language give striking evidence of the progress of modern ideas as regards law. Laymen who desire to follow the procedure in their own cases are no longer baffled by a mystical record unintelligible to all but the initiated. Indeed, if any one particularly wished to manage an action at law for himself under the new practice without legal advice he need not necessarily have "a fool for his client," for there is no obscurity in the rules that ought to prevent such a person from knowing how and when to do the right thing at the right time. So far from this, there are ample forms given in the rules (appendix) for pleadings in twenty-four different sorts of actions, including Common Law, Chancery, Probate, and Admiralty matters, in the majority of which the claim, defence, reply, and point of issue are set out at length, forming a most valuable body of precedents for practical use. The whole measure constitutes in theory undoubtedly the greatest and most searching measure of law reform which our generation has seen.

More detailed information as to the bearing and scope of both Acts will be found in the article upon EQUITY and under the headings of the various divisions of the High Court. See CHANCELLOR, COMMON LAW, &c.

JUDICIAL COMMITTEE OF THE PRIVY COUNCIL. See PRIVY COUNCIL.

JUDICIAL SEPARATION. See DIVORCE.

JUDITH, an apocryphal book of the Old Testament, contains an account of the invasion of Syria and Judah by Holofernes, general of the Assyrians, and of the destruction of the Assyrian army and the death of Holofernes through the courage and stratagem of Judith. The historical and geographical difficulties of this book are so great, and its narrative so improbable, that a great number of critics are disposed to consider it as a romance, probably written in the time of the Maccabees to encourage the Jews in their struggles against the Syrian monarchs. It is not noticed by Josephus, and the first mention of the book is found in the writings of Clement of Rome. By several of the fathers this book is cited as Scripture, and the Council of Carthage included it among the canonical books.

JUG'GERNAUT or **JAGANNATH**, titles under which the Hindu god Vishnu is worshipped at the town of Puri in Orissa. The name of the idol is derived from the Sanskrit word *Jagannātha*, meaning lord of the world. The temple of this deity is believed to be about 700 years old, and is an imposing building reaching to a height of 200 feet. The idol itself is a rudely carved leg of wood painted blue, and provided with movable hands and feet. Certain wild legends are told by the priesthood concerning

the finding of this idol, whose worship has long been wonderfully popular in India. The benefits to be derived from a pilgrimage to the shrine of Juggernaut are preached far and wide by travelling missionaries, and it has been computed that there is an annual attendance of over 300,000 devotees. Of these about a third are present at the great festival of the idol held in March, when the god is drawn in a car from the shrine in the city to his country-seat. Notwithstanding the poverty of the great majority of the worshippers large sums are extracted from them by the priests by means of the sale of sacred food, &c., and the annual revenue of the priesthood has been estimated at nearly £70,000. The stories that have been told about the devotees laying themselves in the path of the car, so as to be crushed by its wheels, are apocryphal. Self-immolation is entirely opposed to the worship of Juggernaut, and the rare deaths at the car festival are almost always accidental. In a closely packed, eager throng of 100,000 men and women at Puri, numbers of them unaccustomed to exposure or hard labour, and all of them tugging and straining to the utmost at the car under a blazing sun, deaths must occasionally occur. There have doubtless been isolated instances of pilgrims throwing themselves under the wheels in a frenzy of religious excitement. At one time several unhappy people were killed or injured every year, but they were almost invariably cases of accidental trampling. A drop of blood even accidentally spilt in his presence at the worship of the true Juggernaut would pollute the officiating priests, the people, and the consecrated food. The few suicides that at rare intervals occurred at the car festival were not so often those of religious fanatics as those of diseased and miserable objects, who took this means to put themselves out of pain. Official returns have placed the facts beyond doubt. Nothing could be more opposed to Vishnu worship than self-immolation. Any death within the temple of Juggernaut renders the place unclean. The ritual suddenly stops, and the polluted offerings are hurried away from the sight of the offended god.

According to Chaitanya, the Orissa apostle of Juggernaut, the destruction of the least of God's creatures is a sin against the Creator. Self-slaughter he would have regarded with abhorrence. The copious religious literature of his sect frequently describes the car festival, but makes no mention of self-sacrifice, and contains not a single passage which could be twisted into a sanction for it.

The actual loss of life, however, caused by the pilgrimage far exceeds anything that has been told concerning the human sacrifices. In consequence of the enormous influx of pilgrims, their mode of diet, and disregard of sanitary precautions, Puri is one of the great strongholds of the cholera. The place has long had a ghastly reputation for the spread of this disease, and some skilled observers have declared that the Juggernaut pilgrimage costs 10,000 lives every year. Much has been done to control and regulate this sacred fair by the British government during recent years; but in spite of all that has been accomplished, the place still continues to be a plague centre, from which the cholera may start at any time on a grim journey round the globe.

JUGLAN'DEE, an order of plants belonging to the MONOCLAMYDEE, consisting of trees or shrubs having eatable nuts and somewhat resinous leaves. The former are the walnuts and hickory nuts of the markets; the first produced by the genus *Juglans*, the latter by that called *Carya*. The timber of trees of this order is valuable, for instance that of the black American walnut, the common walnut, and the hickory. In Java the tree (*Engelhardtia spicata*) attains a height sometimes of more than 200 feet, and a great diameter; the wood is used for cart-wheels. The bark of the tree is acrid and purgative. The oil obtained by expression from walnuts, and purified, is almost equal to olive oil.

There are thirty species in this order, natives of the temperate regions of the northern hemisphere. The flowers are monœcious, the male flowers being arranged in axillary catkins, and the female in terminal or axillary spikes, or the female flowers form a catkin terminated by the male. In the male flower the perianth is adherent to a scale-like bract, and at its base the stamens are inserted, varying in number from three to thirty-six. In the female flower the perianth is more or less adherent to the ovary, and the bract is sometimes adnate, sometimes free. The ovary is inferior, one-celled, at length imperfectly two or four-celled at the base; there is one erect ovule. The fruit is fleshy or membranous, with an exalbuminous seed.

JUGULAR VEINS are the large trunks by which the greater part of the blood is returned to the heart after having circulated in the head, face, and neck. There are two on each side; one external or superficial, and the other internal or deep.

JUGUR'THA, a native African king of Numidia whose fate has given the materials for one of the noblest historical works—the history by Sallust—was an illegitimate son of a son of King Masinissa. His uncle, the King Micipsa, brought up his illegitimate nephew with his own sons, Adherbal and Hiempsal. Jugurtha proved to be a brilliant youth, clever, handsome, bold, and accomplished, and was the darling of the people. Micipsa sent him to assist Scipio in the siege of Numantia (B.C. 131), hoping that his daring might lead him into danger; but the reverse was the result, for Jugurtha so won the favour of the Roman generals that Micipsa was bound to unite him with his own sons in the government. In 118 Micipsa died, and the weak Adherbal and the violent Hiempsal soon found themselves in conflict with their cousin. Hiempsal fell, Adherbal was beaten and fled to Rome with an appeal; but Jugurtha had not been in camp with Romans for nothing, and his envoys went to Rome to plead his cause furnished far more with golden silent arguments than with words. Some of the best of the senators protested against the wholesale and almost open bribery, but in vain. The senate decided that the kingdom should be divided, and Jugurtha had the fertile and populous western half. But a pretext for a quarrel was soon found, and in 112 Adherbal fell into Jugurtha's hands at the capture of his capital town, Cirta, and was by him put to death. The senate was now thoroughly angry, even the bribed partisans of the African king could not withstand the demand for war against him who had attacked and slain their ally and derided their solemn judgments. The war began in 111, under the consul L. Calpurnius Bestia, but Jugurtha submitted at once, paid handsomely both the Roman state and the Roman officers individually, and peace was obtained on these terms. He had gone too openly to work, and was summoned to Rome under a safe-conduct. In the event Jugurtha was unable to convince the senate, was allowed to depart, and the war began again, the consul Spurius Postumius Albinus leading the Romans. The Roman army, half of it in secret correspondence with its nominal foe, was thoroughly disorganized, and therefore easily beaten and made to march under the yoke (a cross spear set upon two others stuck into the ground) in sign of utter submission. The senate agreed to a second peace (110). But this was more than the Roman people could bear. A wave of indignation swept the traitors Bestia and Albinus into exile, cancelled the treaty, and sent the rigidly incorruptible Quintus Cæcilius Metellus as general, with Caius Marius as his subordinate, a brave soldier who had risen from the ranks to high command. The campaign began in 109. Jugurtha tried unconditional submission, but Metellus had determined to wipe out the shame of the Roman senate, and to be content with nothing less than the death of the shifty Numidian. A severe battle, in which Metellus and Marius were cleverly separated by

Jugurtha, but gained a double victory nevertheless, drove Jugurtha to guerilla warfare as his only resource. Eventually Bocchus, king of Mauritania, espoused the cause of his son-in-law Jugurtha, and the two kings advanced against the Romans. Meanwhile Marius had accused Metellus at Rome of purposely protracting the war, had gained the consulship, and had been appointed commander-in-chief of the army of Africa in 106, with Lucius Cornelius Sulla as his second in command. A half-victory by Jugurtha was lost by neglect to follow up the advantage. Bocchus determined to treat, and sent to ask Sulla to come to him. It was a perilous journey, but Sulla undertook it, and won the first step to his future dictatorship by inducing the king to give Jugurtha into his hands. He brought him back to the camp of Marius in chains, and Marius had him and his two sons led in his triumph at Rome on the 1st of January, 104 B.C. Jugurtha, a child of the sun and the desert, was thrown into the damp cold dungeon of the Tullianum or Mamertine prison, yet existing on the verge of the Forum at Rome. "It is a bath of ice," shuddered the wretched prince as he lay down to die of hunger and cold. Lest such horrid cruelty should perish from men's memories Napoleon imitated it when he froze to death the negro ruler, Toussaint l'Ouverture, amid the snows of the Jura, after his brief reign in the tropical heat of San Domingo.

JUJUBE, the name of a plant and of its fruit, which is pulpy and resembles a small plum. The plant is a species of *Zizyphus* (*Zizyphus vulgaris*), a native of the East Indies. The fruit is emollient and laxative, and was formerly used in pectoral decoctions. The lozenge jujubes are only an imitation, and are not even flavoured with the fruit. *Zizyphus lotus* grows along the African shore of the Mediterranean, and its agreeable fruit is supposed by some to be the lotus of the ancients. *Zizyphus jujuba* is cultivated by the Chinese for the sake of its fruit. The genus belongs to the order RHAMNACEÆ.

JULIA would be the name of any noble lady of the Julian gens or clan at Rome. The most famous Julias are the following:—(1) The wife of Caius Marius and aunt of the great emperor, Caius Julius Cæsar. (2) The sister of the emperor and grandmother of Augustus. (3) The daughter of the emperor, his only child, married to Pompey the Great, although he was her senior by twenty-three years. Most unhappily she died in childbirth B.C. 54, and undoubtedly the face of the world was changed thereby, since the union of the two great chiefs quickly fell to pieces. (4) The worthless daughter of the Emperor Augustus, and his only child. She married Marcellus, her cousin, the adopted heir to the empire; and at his death the great Agrippa, by whom she had the princes Caius and Lucius Cæsar, in their turn adopted as heirs by their grandfather, but neither of whom lived to succeed him; she also had by Agrippa the first and virtuous Agrippina, and a younger Julia as bad as herself. After the death of Agrippa she married as her third husband (B.C. 12) Tiberius, the future emperor. Her shameless indecency disgusted and banished her husband from her society, and at length provoked the notice of her father. Augustus banished her first to the island of Pandataria and then to Rhegium. Tiberius withdrew all but the barest necessities from her at his accession, A.D. 14, and she died the next year. (5) The younger Julia, daughter of Agrippa and Julia. This Julia was so abandoned that at the request of her husband, L. Æmilius Paulus, her grandfather Augustus banished her to an island off Apulia in the year 9. The poet Ovid, one of her lovers, was banished at the same time. She died in A.D. 28. Other Julias are the sister of Germanicus and the daughter of Germanicus (with whom Seneca's name is connected), both of whom were murdered by Messalina's order in 59. For Julia Domna see DOMNA, and for Julia Mama see MAMA.

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JULIAN, Roman emperor. Flavius Claudius Julianus was the son of Julius Constantius, brother of Constantine the Great, and was born in 331 A.D. After Constantine's death the soldiers massacred the brothers, nephews, and other relatives of that prince in order that the empire should pass undisputed to his sons. Two only escaped from this butchery—Julian, then six years old, and his half-brother Gallus, then thirteen years of age. Constantius, the son and successor of Constantine in the empire, exiled Gallus into Ionia, and intrusted Julian to the care of Eusebius, bishop of Nicomedia, and he was instructed in Greek literature by Mardonius, a learned eunuch. His fellow-pupils, St. Gregory Nazianzen and St. Basil, became as celebrated as Christians as he for his rejection of Christianity. About the age of fourteen he was sent to join his brother Gallus in Cappadocia, where both were treated as princes, but closely watched. The youths were taught the Scriptures, and were even ordained lecturers, and in that capacity publicly read the Bible in the church of Nicomedia. After the tragical death of his brother Gallus in 355 Julian was recalled to court by the influence of the Empress Eusebia, when Constantius named him Cæsar, and gave him the government of Gaul, together with his sister Helena to wife. Julian made four campaigns against the Germans, in which he displayed great skill and valour, and freed Gaul from the barbarians. He spent his winters at Lutetia (Paris), and became esteemed for his equitable and wise administration. Constantius, always suspicious, ordered Julian to send him back some of the best legions in Gaul to be employed against the Persians. In 360 he therefore assembled the legions at Lutetia and bade them farewell; but his devoted soldiers refused to leave him, and broke out into friendly rebellion, saluting him Augustus. Julian sent messengers to Constantius to deprecate his wrath, but the death of the emperor left the throne open to him in 361. He proceeded to Constantinople, where, being proclaimed emperor in December, 361, he reformed the prodigality of the household, issued several wise edicts, corrected many abuses, and established a court at Chalkedon to investigate the conduct of those who had abused their influence under the preceding reign. On assuming the purple Julian openly professed the old religion of Rome, but issued an edict of universal toleration. Julian has been called the Apostate, and many falsehoods were propagated about him by early Christian writers; but it seems doubtful whether after his boyhood he had been a Christian in his heart. That he was no believer in the vulgar mythological fables is evident from his writings, especially the piece called "The Cæsars," where each emperor is greeted as he arrives in the other world by a long accusation of his crimes, against which he defends himself as well as he can. Julian was a man of very cultivated mind, and a delightful though never original writer. He was a most active and just ruler, and in a profligate age severely virtuous. Julian, having resolved to carry on the war against the Persians, repaired to Antioch. His simple attire, his uncut beard, and the philosophical austerity of his habits drew upon him the sarcasms of the population of Antioch. The emperor revenged himself by writing a satire against them called "Misopogon." He set off on his expedition with a brilliant army, crossed the Euphrates, took several fortified towns of Mesopotamia, crossed the Tigris, and took Ctesiphon; but here his progress ended. The close Roman legions were harassed by the light cavalry of the Persians, and reduced to great distress for want of provisions. Sapor, the Persian king, was, however, inclined to come to terms, when in a skirmish Julian received a mortal wound. He expired the following night, 26th June, 363, with perfect calmness and composure.

JULIAN ALPS. See ALPS.

JULIAN PERIOD is a term of years often employed in chronology in order to avoid the ambiguity attendant on

reckoning any time antecedent to our era, and to facilitate comparisons of different eras with each other. It was the invention of Joseph Scaliger in 1582, and is the only extended mode of reckoning time which is founded on a strictly scientific basis. The beginning, or the year 1, of the Julian period is the only year when sun, moon, and Roman indiction were also each one beginning its own cycle, and 7980 years must elapse before this occurs again. The Julian period consists of 7980 Julian years, and is reckoned as having begun 4713 years before our era, so that our year 1891 corresponds to 6694 Julian period. The era of the creation, or Anno Mundi, which has been used by Christian and Jewish writers, cannot be considered a fixed point, as chronologists and controversialists are far from being agreed as to the precise time of its commencement, some placing the creation 4004 years *n.c.*, others, such as the early Alexandrian Christians, 5502 *n.c.*, and the Greeks and Russians at 5508 *n.c.*; while Egyptologists, to say nothing of geologists, take quite another view of the matter. The Julian period is produced by the multiplication of the lunar cycle of nineteen, solar cycle of twenty-eight, and Roman indiction of fifteen years each.

The *Julian Era* must not be confused with the Julian period. The Julian era began 1st January, 45 *n.c.*, and commemorated the reformation of the calendar by Julius Cæsar.

JULIUS was the name assumed by three of the popes.

JULIUS I., a Roman, reigned from 337 to 352. He is noteworthy for his skillful management of the Arian controversy. The Eusebian bishops at the synod of Antioch in 341 confirmed their deposition of Athanasius from the see of Alexandria. Julius invited both parties to lay their case before a synod of the whole church, over which he would preside. This failed, and Athanasius was banished from Alexandria. He came to Rome and was recognized as bishop by Julius in full synod notwithstanding (342). Julius next convoked the Council of Sardica (Illyria), when 300 Western (Catholic) met seventy-six Eastern (Arian) bishops (347). The former confirmed the decisions of Julius, to the great gain of the power and influence of the papacy; the latter withdrew, being in such a hopeless minority, made a council of their own, and amused themselves by deposing Julius, Athanasius, and others. Julius died in 352.

JULIUS II. (Giuliano della Rovere) reigned from 1503 to 1513. He was sixty years old when he was elected, but he was one of the most vigorous and courageous of the whole line of the popes. He was educated by the Franciscans, but did not himself become a member of the order. His uncle, Sixtus IV., raised him to the cardinalate in 1471, and made him bishop of eight several sees, in addition to the rich archbishopric of Avignon, then still in the possession of the popes. He was named legate to France in 1480, and by his skillfulness in affairs was soon recognized as first among the cardinals. On the death of Innocent VIII. he would undoubtedly have been elected but for the discreditable means used by the Borgia faction, means only too successful in shaming the church, after a disgraceful Innocent VIII., with a far more disgraceful Alexander VI. (Borgia). Cardinal Della Rovere was no longer safe in Italy. He fled to Paris, and incited Charles VIII. to his famous descent upon Naples, in which he accompanied him. He even succeeded in inducing Charles to prepare for a court of inquiry at Rome, when he entered the city, into the conduct, ecclesiastical and moral, of the infamous pope whose crimes, and whose son's and daughter's crimes, filled Italy and the world with horror. But again Borgia's wealth and the offer of a cardinal's hat procured him friends near the king, who succeeded in defeating the voice of truth. Pius III. succeeded Alexander VI., but he was a dying man when he was elected (indeed that was his chief title to election); and the

brief weeks before his death were used by Della Rovere in conciliating that wicked faction whom he was not strong enough to conquer. Cesare Borgia was won over, and Cardinal Della Rovere received that unanimous election to the papacy which his merits ought to have obtained eleven years before. He was crowned as Julius II. in 1503. He at once exhibited the most remarkable dexterity in diplomatic combinations. He conciliated the warring factions of the nobles at Rome, while he stimulated division abroad; Borgia found himself compelled to give up the lordships he held in the papal dominions, and only the Venetian holdings remained. To rid the papal states of Venice by force was beyond the Pope's power. He therefore made the League of Cambrai against the republic, with the King of France (Louis XII.), the Emperor of Germany (Maximilian), and the King of Spain (Ferdinand of Aragon), and gained his end. But he gained more than his end; and in 1570 he removed the interdict under which he had placed Venice, and formed an Italian league to drive out the "barbarians" whose aid he had previously so gladly received. But England held to France and Germany, and a council actually met at Pisa in 1511 to consider the propriety of deposing Julius. The arch-diplomatist was unwearied in his intrigues, and at length in 1511 he was successful in arraying England, Germany, and Spain with Venice and himself against France, and the French were driven from Italy. But the problem still remained to get rid of these equally inconvenient foreigners by whom this had been accomplished; and before the old man of seventy could get well into this new enterprise he was carried off by fever, February, 1513. He was succeeded by one of the Medici family, Leo X.

Julius does not shine as a priest so much as a king and warrior. It is difficult to think of the rugged old man, whom Raffaele's superb portrait in our National Gallery still makes live for us, as head of a church. Julius had all the kingly virtues and a good many of the kingly vices. His diplomacy stuck at nothing, and will not bear the most cursory scrutiny. On the other hand, had he been pope (as he ought to have been) in 1493 he might have gained unity for Italy and saved centuries of bloodshed. One great ruler could have accomplished that if time were given him, and Julius was that ruler. His whole mind worked in vast schemes. He it was who set about the grandest church in the world, and laid the foundation stone of St. Peter's in 1506. He it was who ordered for himself that magnificent tomb (never finished), one small portion of which is the wonder of the world to this day—the single figure of Moses, by Michelangelo. He it was who brought Raffaele to Rome in 1508, and set him to work at those magnificent "stanzes" or chambers of the Vatican, which are the delight of painters; and in the same year he induced Michelangelo to begin the *chef-d'œuvre* of fresco, the ceiling of the Sistine Chapel. Perugino and others were still at work in painting, Bramante and others were encouraged in architecture. Leo X. did but carry on the splendid course; it was Julius II. who began all those great works.

JULIAN III. (Gian Maria del Monte) reigned as pope from 1550 to 1555, being born at Rome of good family in 1487. He was one of the presidents of the Council of Trent in 1547. In 1550 he was unanimously chosen successor to Paul III. He was a man of indolent character, with a taste for architecture and gardening, which he indulged in a truly princely style.

JULIUS CÆSAR. See CÆSAR.

JUL'LIEN, LOUIS ANTOINE (1812–60), a musical conductor to whom, beneath a terrible mass of charlatanism, the popularity of good music owes a considerable debt, was the son of a French bandmaster. He studied at the Conservatoire at Paris with very indifferent result; tried conducting and composing in vain in Paris, and came to

London in 1838. Here he hit the public taste, and from 1842 to 1859 produced his series of annual promenade concerts, by which he is honourably remembered. His enormous shirtfront and cuffs, his black curled masses of hair, his jewelled baton, his poses and attitudes, and the sigh of exhaustion which succeeded his sinking into his gilded chair at the close of a great piece must not blind us to the fact that his hand was superb, and that he played for the first time Mendelssohn's, Mozart's, and Beethoven's symphonies to audiences who only paid a shilling. In 1847 he opened a season of English opera at Drury Lane, bringing forward Mr. Sims Reeves for the first time. (It is indeed noteworthy how many of the finest musical artists came before the British public under the auspices of this man.) The speculation was a failure, and Jullien was bankrupt (1848). His concerts soon put him straight again, but the fire at Covent Garden in 1856 ruined him by burning all his music. In 1857 he lost heavily by a connection with the Surrey Gardens Company, and in 1859, hastily flying from his creditors to Paris, was arrested there and thrown into prison. The shock was too great for his brain, and the public was sorry to learn that an old favourite was lying in a lunatic asylum almost as a pauper. A subscription was at once opened for him, but before the scheme could be brought before the public Jullien had died, 14th March, 1860.

JUL'PAUN, a food made of parched rice, much used in India.

JULY, now the seventh, was originally the fifth month of the year, and was called by the Romans *Quintilis*. In the old Latin or Alban calendar Quintilis had a complement of thirty-six days. Romulus reduced them to thirty-one; Numa to thirty; but Julius Cæsar restored the day of which Numa had deprived it. Our Anglo-Saxon ancestors called July *Mad-month*, mead month, from the meads being then in bloom.

JUMNA (*Jamuna*), a river of the north-western provinces and of the Punjab, British India. It rises in the Himalayas, in the native state of Gahwal, about 5 miles north of Jammotri, and about 8 miles north-west of the lofty mountain Bandarpanch. In the ninety-fifth mile of its course, the Jumna leaves the Sivalik Hills and enters the plains at Faizabad. It now flows for 65 miles in a south-south-west direction, dividing the districts of Umballa (Ambala) and Karnal in the Punjab from those of Saharanpur and Muzaffarnagar in the North-western Provinces. By the time the Jumna debouches on the plains, it has become a large river, and near Faizabad it gives off both the western and eastern Jumna canals. Near Bidhau it turns due south, and runs in that direction for 80 miles till it reaches the city of Delhi; here it turns south-east for 27 miles to near Dankaur, when it again resumes its southerly course. It flows through the centre of the district of Muttra till it leaves it near Mahaban to enter the district of Agra. The Agra Canal forms a recut and an important work.

From Mahaban the Jumna turns eastwards and flows a little south by east for nearly 200 miles. In this part of its course the river winds in a remarkable manner through the ravines of Agra and Etawah districts; the bed of the stream is narrower, and the banks higher and steeper than in its upper reaches. It passes the towns of Agra, Ferozabad, and Etawah, from whence it takes a more southerly direction, and flows south-east for 140 miles to Hamirpur. From Hamirpur, till its junction with the Ganges at Allahabad, the Jumna flows nearly due east. It finally falls into the Ganges, 3 miles below the city of Allahabad, the only important town which the Jumna passes during this last section of its course.

The trade on the Jumna is not now very considerable. In its upper portion timber, and in the lower stone, grain, and cotton, are the chief articles of commerce, carried in

the clumsy barges which navigate its waters. These have sails, and always take advantage of a favourable wind; at other times they float down with the current, or are slowly and laboriously tugged up against stream by long strings of boatmen. Its waters are clear and blue, while those of the Ganges are yellow and muddy; and at the point of junction below the fort at Allahabad the difference between the streams can be discerned for some distance beyond the point at which they unite. Its banks are high and rugged, often attaining the proportions of cliffs, and the ravines which run into it are deeper and larger than those of the Ganges. It traverses in great part the extreme edge of the alluvial plain of Hindustan, and in the latter part of its course almost touches the Bundelkhand offshoots of the Vindhya range of mountains. Its passage is therefore more tortuous, and the scenery along its banks is more varied and pleasing, than that of the Ganges.

JUMNA CANALS. The Eastern Jumna Canal is an important irrigation work in Saharanpur, Muzaffarnagar, and Meerut (Mirath) districts, North-western Provinces. It derives its supply from the left or eastern bank of the river Jumna, irrigates the western portion of the Upper Doab, and eventually is absorbed into the Jumna in Meerut district, after a course of 130 miles. The frequent recurrence of famines in this part of India before the establishment of British rule, and for some years subsequently, caused attention to be directed at an early period to the necessity of an extended system of canals. Being the first large irrigation scheme undertaken in India by the British, some changes in detail became necessary at a later period, but the work as a whole reflects the greatest credit upon its projectors. From the Jumna headworks to a point opposite Alampur, the bed consists of boulders or shingle, gradually decreasing in size; thenceforward to Sakai sand and clay predominate on the bottom, interspersed between Sakai and Jauli with nodular carbonate of lime, and merging below Jauli into pure sand. The Western Jumna Canal, originally known as the Doab Canal, was formed on the line of an old canal ordered to Ali Mardan Khan. But it is probable that this ancient canal was quickly abandoned by its native projectors on account of the great engineering difficulties met at its head. The old work scarcely aided in diminishing the expense of reconstruction.

JUNCA CÆÆ, a small order of plants, so named from Lat. *juncus*, the rush, which is contained in the type. The order belongs to the series Cydicæ of the Monocotyledonous.

Two genera, *Juncus* and *Luzula*, are common throughout the whole world. The rest are mostly from South Australia, South Africa, Antartic and Andean States. A few *Xanthorrhoea arborescens* the grass gum tree or tree bay of Australia. It is quite different in appearance from the rushes, having a palm-like stem crowned by long narrow leaves, with a tall shoot from their centre bearing the numerous minute flowers. The stem is covered by the persistent bases of the leaves, the upper parts of which have decayed as the trunk lengthened, these are firmly attached together by a resin which exudes from the stem, and the whole is often blackened by fire bush fires. At a short distance they are easily mistaken for a native with his spear. *Kingia* is also a native of Australia, and has the same kind of appearance. The wick of the rushlight was the pith of *Juncus*, and the Chinese still use several species in the same way. The order is characterized by the regular flowers with an inferior perianth of six parts, six (sometimes three) stamens, the ovary with one to three cells and one or several ovules, the three-valved capsule, and the small embryo inclosed in more or less fleshy albumen.

JUNE, the sixth month of the year, named from the Latin *Junius*. Ovid, in his "Fasti," makes June assert

that the name was expressly given in honour of herself. In another part of the "Fasti" he gives the derivation of *junioribus* (the younger), as May had been derived from *maiores* (the elder). In the old Latin calendar June was the fourth month and consisted of twenty-six days. Thirty days were afterwards assigned to it.

JUNGERMANNIEÆ (Scale Mosses), a rather extensive division of cryptogamic plants resembling mosses in appearance, but very distinct from them in many points of structure. The species inhabit the trunks of trees, damp earth, or even the young shoots and leaves of other plants in cool moist climates, especially such as are temperate. Some have the stem and leaf formed into a frond, or thallus, resembling that of a lichen, but more commonly the species have leaves with stipules at their base. They belong to the *HEPATICÆ*, and are distinguished generally by the spore-cases, which split into four valves, and contain spiral fibres (called *elaters*).

JUNG'FRAU ("the Maiden") is the name of a lofty summit of the Swiss Alps, on the boundary line between the cantons Bern and Valais, 13,671 feet above the sea. It is surrounded on all sides by rocks and precipices, and capped with perpetual snow; but its summit has been attained by several Alpine explorers.

JUNIOR RIGHT is another name for **BOROUGH ENGLISH**.

JUNIPER, OIL OF. This essential oil, from the berries of the *Juniperus communis*, natural order Conifereæ, has the same composition as that of oil of turpentine ($C_{10}H_{16}$), and boils at $160^{\circ} C.$ (320° Fahr.) It is insoluble in alcohol, and does not form a solid camphor. It is used in medicine as a stimulant and diuretic.

JUNIPERUS, a genus of hardy, evergreen, woody plants, belonging to the order *CONIFERÆ*. The most important species are the following:—

Common Juniper (*Juniperus communis*), growing wild in all the northern parts of Europe. Occasionally the juniper becomes a small tree. The fruit is used in considerable quantities in the preparation of gin, and in medicine as a powerful diuretic. Oil of juniper is said to be the most powerful of all diuretics in doses of four drops. The berries were formerly employed as a spice; the spirit prepared from them was called in France *Genièvre*, a word which in England became *Geneva*, and afterwards *gin*.

Savin (*Juniperus Sabina*) is found wild in the middle of Europe and the west of Asia, inhabiting the most sterile soil, and is frequently met with in this country in shrubberies. Like the common juniper, it is a diuretic and uterine stimulant, but is so powerful that its use is highly dangerous, except in the hands of regular practitioners. It is a well-known violent emmenagogue. Oil of savin is a local irritant, producing blisters when applied to the skin; taken internally it is drastic and emetic.

Bermuda Red Cedar or Pencil Cedar (*Juniperus Bermudiana*) is little known in Great Britain in consequence of its not bearing the climate without protection. It is a native of the Bermudas, where it becomes a large tree with a soft fragrant wood, the value of which is well known from its use in cabinet-work and the manufacture of pencils.

The Red Cedar (*Juniperus Virginiana*) is a native of the eastern part of North America, as far south as Central America. Its timber is very durable, and is of great value.

JUNIUS. *Who was Junius?* is a question which, after all the trouble spent upon it, has as yet resisted every inquiry. It is probably the greatest of all historical puzzles. That letters bearing this signature should appear for three years, from 21st January, 1769, to 1772, in the *Public Advertiser* newspaper, so bold in their tone, so fine in their style, so consummate in their statesmanship, and so accurate in their knowledge of the innermost secrets of public men and public affairs, that the original MSS. should exist in large quantity and have been pored over and

written about for a century without result, is most astonishing. Junius struck a splendid stroke for liberty, appealing in the finest of all his many letters to George III. himself to "lay aside the wretched formality of a king, and speak to his subjects with the spirit of a man and the language of a gentleman." "Tell them," cries he, "that you have been fatally deceived." His main points against the king were his futile attempts to revive personal government by the monarch and through unworthy favourites, backed by bribery and corruption. His attacks on the Duke of Grafton have ruined that statesman with posterity; his thrashing of his first antagonist, Sir William Draper, made that excellent man a laughing-stock. Junius stood strongly for "Wilkes and liberty," and supported popular rights in the most splendid manner ever yet known in the language of English politics. At first every one agreed that Burke, and Burke alone, had a mind so vast as to be capable of producing the Junius letters. Dr. Johnson, one of the many opponents of Junius in print, publicly declared, "I should have believed Burke to be Junius, because I know no man but Burke who is capable of writing these letters; but Burke spontaneously denied it to me." The handwriting is not Burke's, but it might be that of an amanuensis; the style is not Burke's, but Burke could adopt any style, as he had shown in more than one of his works; against his disclaimer, however, no argument can be urged. Horne Tooke was long credited with Junius because of the handwriting, but where is the capacity of Horne Tooke for such thoughts? Lord Chesterfield was another favourite, as the handwriting, though not like his, closely resembled that of his amanuensis. Earl Temple has been named with much plausibility. Pitt's knowledge of Junius, Grenville's open admission that it was Temple, given to Buckingham, and the close likeness of Lady Temple's hand to that of Junius, are very strong points. Yet there again comes in the question of ability. If Temple possessed this ability, how did he contrive so carefully to conceal it all the rest of his life? But all the claimants (and there are nearly forty) paled their ineffectual fires before Sir Philip Francis. Whether Francis were or were not Junius he liked to be thought so. He said to Lord Aberdeen in a dispute on the subject waged before his face, "Gad, if men force laurels on my head, I'll wear 'em;" and he gave his second wife on their marriage in 1814 a handsome set of Junius, with instructions to observe secrecy. But the real Junius had asked for two sets in December, 1771 ("This is all the fee I shall ever require of you"), and Woodfall had sent them; nevertheless this gift of Sir Philip, as also his legacy of a like set, were neither of them the Woodfall copies. In 1816 Taylor's "Junius Identified" pointed to Francis as the author, and gave many proofs of this. Sir Philip knew of Taylor's design, for he told him of it, and he lived two years after the book appeared and made no movement of contradiction. Certainly if he were not the author such conduct is most disgraceful. Pitt said openly that he knew who Junius was, and that it was not Sir Philip Francis, and Burke told Reynolds that he also knew Junius, but would name no one. On the other hand, of the later writers Macaulay considers it absolutely proved in favour of Sir Philip, even when the inferiority of his style and the coarseness of his handwriting are admitted as against the polish and the fine caligraphy of Junius. The question might be supposed decided on so great authority, but still more recent investigators have shown that Francis' course of life at the time renders it practically impossible that he could have written Junius, while it is found that every friend and patron that Sir Philip ever had is attacked somewhere or other in the letters, and that often with no sparing hand. Further, Francis consulted Sir William Draper, whom Junius had persistently made his butt, on a matter of honour. This was about his being included, though a personal enemy of

Warren Hastings, in the list of managers of the impeachment of that statesman, and Francis was guided by Sir William's advice, as he publicly stated in the House of Commons. It is, therefore, to say the least, not proved that Sir Philip Francis wrote Junius; but it is also clear that he has by far the best claims of all the forty competitors. The extraordinary fact remains that the cleverest statesman in England between 1769 and 1772, writing continually and on all kinds of political subjects, writing with a finished irony, a political style, a trenchant vigour which have hardly ever been equalled, is as unknown to us as if he had lived in the dark ages, and that with his very handwriting before our eyes.

JUNK, a Chinese vessel, often of large dimensions. It has a high fore-castle and poop, and usually three masts. Though junks are clumsy vessels, incapable of much seamanship or speed, they have proved themselves seaworthy on voyages extending to Europe and America. The Japanese junk is superior to the Chinese.

The term junk is applied by British sailors to the salt meat supplied to vessels for long voyages.

JU'NO, a Roman divinity. *Ju-no* is evidently the counterpart of *Ju-piter*, and she was the patroness and protector of women, as he of men. Her great sanctuary at Rome was on the Aventine. She was especially the goddess of marriage, of childbirth, &c.; and also, as *Juno Moneta*, of family wealth. Later on she became almost confounded with the Greek *HERA*. The genealogy and attributes of the Greek deity were annexed *en masse*, and the genuine ancient Latin divinity quite disappeared.

JUNO is the name of one of the largest of the asteroids.

JUNOT, ANDOCHE, DUC D'ABRANTES, was a soldier of fortune, who first attracted Napoleon's attention by his bravery in the field. Andoche Junot was born at Bussy-le-Grand in 1771. He first began to study for the law; but the political events of 1791 induced him to enlist in the battalion of volunteers raised in the department of Côte d'Or. He served under Bonaparte at Toulon, where he became a captain, as well as aide-de-camp to Napoleon. He was exceedingly courageous; and it was this quality of fearlessness which personally endeared him to Napoleon. One day Bonaparte wished a despatch written, and asked if any soldier present could write. Junot stepped from the ranks and began the task. A shell plunged at his feet, covering him and his paper with sand. He only laughed. "We shall do without pounce," he said (pounce being the fine sand then scattered upon writing to dry the ink), shook his paper, and went on writing. This trait won Napoleon's heart and founded Junot's fortunes. He accompanied Bonaparte to Italy in 1796, and to Egypt in 1798. Having greatly assisted him, on the 18th Brumaire, in overthrowing the Directory, he was made commandant of Paris, and created general of division in 1801. Eventually, under the patronage of the emperor, he became Duc d'Abrantès, and received the grand cross. To him was intrusted the task of invading Spain and Portugal in 1807-8, where for some time he exercised a military tyranny; but at length he was signally defeated by Sir Arthur Wellesley at the battle of Vimeira, and compelled to evacuate the country. From this period he lost favour with Napoleon, and was refused employment in the campaign of 1813. He was sent as governor to Illyria. Shortly afterwards his mental faculties became disordered, and he died in 1813. Madame Junot, duchess of Abrantès, wife of the general, after the fall of Napoleon was obliged to support herself by the efforts of her pen in consequence of all her family estates being confiscated. Her principal work was "*Mémoires ou Souvenirs historiques sur Napoléon*," published in 1831. Its statements are to be received with caution, however. Madame Junot was at length reduced to extreme poverty, and retired to a *maison de santé*, where she died in 1838.

JU'PITER, the supreme ancient Roman deity. Jupiter was originally called *Jov-is* or *Diovis Pater*, or *Dies-piter*, or *Diu-piter*, the *Diu* becoming softened in pronunciation into *Ju*, in the same manner as the Latin word *diurnus* has become *journal*. Jupiter or Diupiter would therefore mean the father of day, light, or the air; the first part of the word contains the same root as the Latin adverb *diu* and adjective *diu-rnus*.

The Roman poets attributed to Jupiter the same power and attributes with which the Greeks invested Zeus, who was, according to Homer, the son of Kronos and Rhea. His wife was Juno (*Héra*), and their children Vulcan (*Héphaistos*) and Mars (*Arès*), and in this presentment Jupiter is merely a translation of Zeus.

Jupiter was usually represented as seated on an ivory throne, with a sceptre in his left hand and a thunderbolt in his right. The eagle, his favourite bird, was generally placed by the throne. Jupiter was the guardian of law and order, consequently on all state occasions he was invoked. As god of daylight white was sacred to him; his flames wore white, his chariot was drawn by white horses, and the consuls wore white robes when sacrificing to him.

JUPITER, the name of the greatest planet in the solar system. We refer to the article **SOLAR SYSTEM** and to the tables it contains for the numerical details of the orbit of Jupiter; we here give such further information as space will permit. The mean diameter of Jupiter is about 85,000 miles. Jupiter rotates so rapidly on his axis that his equator is very protuberant, inasmuch that the equatorial diameter exceeds the polar diameter by about 5000 miles. In volume Jupiter exceeds our earth about fifteen-hundredfold, while placed in the scales Jupiter weighs 339 times as much as the earth. The discrepancy between these two figures is remarkable; it proves that the specific gravity of Jupiter is much less than that of the earth, being indeed little more than that of water. The mean distance from the sun is 480,000,000 miles, but owing to the eccentricity of his orbit the actual distance fluctuates between 457,000,000 and 503,000,000. His time of revolution is fifty days less than twelve years. Jupiter can be easily recognized by his brilliant white light, in which he is surpassed by Venus alone. He is in view for months together, and during some part of every year. Near the time of opposition his brilliancy is such as to cast shadows in a darkened room.

The telescopic appearance of Jupiter is of very great interest. The surface of the planet is usually seen marked with certain bands parallel to the equator, suggesting a resemblance to the trade-wind bands on the earth's surface; but these markings are very irregular and constantly changing, sometimes nearly the whole disc is covered with bands, sometimes large spots are seen which may last for days, for months, or for years. We are forced to believe that even if there be any solid body in Jupiter at all we do not see it. What our telescopes show is merely a vast stratum of atmosphere containing clouds and vapours, in which the denser portion of Jupiter is enveloped. The low specific gravity of Jupiter can thus be readily accounted for.

The telescopic interest of Jupiter is chiefly due to the very beautiful group of satellites by which he is attended. The system forms indeed one of the most interesting scenes in the heavens. The satellites are so close to Jupiter that his bright light overpowers them, and they cannot generally be seen with the unaided eye, though cases have been recorded in which they have been so detected. Any small telescope will, however, show them, and the present writer often views them with an ordinary opera-glass. There are four satellites, and to aid in their identification the positions for each day are given in the *Nautical Almanack*. The third out from Jupiter is usually brightest, and the fourth goes out much further than the others.

The eclipses of the satellites are produced when they enter the line of shade which the great globe of Jupiter casts behind him. They are phenomena of the very greatest interest and beauty, and fortunately they are within the powers of very small telescopes when the eclipses do not occur too close to the body of the planet. The satellites are also frequently occulted by passing behind the globe of Jupiter, but such occurrences are not of equal interest with the eclipses. Extremely remarkable are the transits of satellites over the face of Jupiter, while the shadow thrown by the satellites is seen as a deep black spot moving over the brilliant face of the planet. When not near opposition the shadow of satellite III. or IV. may be far within the disc, while the satellite itself is still apart from the planet. The fact that the satellites become invisible when they enter the shadow of Jupiter made by the sun, shows that Jupiter himself cannot emit any appreciable degree of light. The measures of the dimensions of the satellites are uncertain, but it seems that the diameters range between 2200 and 3700 miles; the third from the planet is the largest, and the second is the smallest. The volume of the smallest satellite is therefore very near that of our moon.

The theory of the movements of the satellites offers to the mathematician problems of the greatest difficulty. The mutual attractions of the three first satellites give rise to a very remarkable relation between their motions, which may be expressed by the two laws—

1. That the mean motion of the first satellite added to twice the mean motion of the third is equal to three times the mean motion of the second.

2. That if to the mean longitude of the first satellite we add twice the mean longitude of the third and subtract three times the mean longitude of the second, the difference is always 180 degrees.

It had first been learned from observation that these remarkable laws were obeyed. Laplace showed that they were so far a consequence of the law of gravitation, that if the movements were once commenced with these laws nearly fulfilled, gravitation would demand that they must continue for ever.

It was by the observations of the eclipses of Jupiter's satellites that the velocity of light was first detected and measured. Eclipses sometimes happened several minutes earlier or several minutes later than had been anticipated. The discrepancies were traced to the varied positions of the earth with regard to Jupiter, so that the time at which an eclipse was perceived depended upon the length of the journey.

The following table gives the elements of the satellites of Jupiter, but the names are so uncertain that they have not been included.

	Sidereal Revolution.				Distance in		Orbit inclined	
	Days.	Hrs.	Min.	Sec.	Radius of	Jupiter.	to Jupiter's	Equator.
I.	1	18	27	33.595 ...	6.04853 ...	0'	0'	7"
II.	3	13	13	42.010 ...	9.62347 ...	0	1	6
III.	7	3	42	33.360 ...	15.35021 ...	0	5	3
IV.	16	16	32	11.271 ...	26.99835 ...	0	0	21

There is a very remarkable period connected with the movements of the satellites, for

217 revolutions of I.	require	437 days 3 hours 44 minutes.
123 " " II.	"	437 " 3 " 42 "
61 " " III.	"	437 " 3 " 36 "

But this relation does not extend to the fourth satellite, for 26 revolutions of IV. require 435 days 14 hours 16 minutes.

It has been supposed that certain marks on the surfaces of the satellites prove that they constantly turn the same face to Jupiter, just as the moon constantly turns the same face to the earth.

JU'RA (meaning "deer island"), one of the Hebrides, Scotland, immediately north-east of Islay. It is the most rugged of the group, the surface being mountainous throughout. In the south are three peaks, called the Paps of Jura, the principal of which is 2566 feet high. The length of the island from N.E. to S.W. is 27 miles, and the breadth from 2 to 8 miles. The estimated area is about 84 square miles, or 58,000 Scotch acres, only 600 of which are arable. The population in 1881 was 781. With the adjacent islands of Balnahan, Garvelloch, Pladda, &c., it forms a parish, with a total population of 1052. The principal village is Jura, on the eastern coast. Oats, barley, potatoes, flax, slate, and iron ore are the chief products of the island, whose scenery is very picturesque.

JU'RA, a department in France, formed out of the province of Franche-Comté, and named from the range of mountains that traverses it, is bounded north by the department of Haute Saône, north-east by that of Doubs, east by Switzerland, south by the department of Ain, and west by those of Saône-et-Loire and Côte d'Or. Its greatest length from north to south is 72 miles, from east to west 39 miles. The area is 1928 square miles, and the population in 1881 was 285,263.

Surface and Soil.—The department is diversified by mountains, plains, and marshes. Two-thirds of its extent are covered with the **JURA MOUNTAINS**, of which the highest summits are Reculet, Tendre, and La Dôle. The surface presents throughout its whole length three very marked and distinct divisions:—(1) The western part, which consists of a low plain about 7 miles wide; (2) the first mountain elevation, which, rising suddenly from the plain, forms a plateau nearly 10 miles wide; and (3) the high mountain district to the east of the other two, consisting of lofty summits and deep valleys, and extending in width as far as the other two divisions together. The soil of the plain, which consists of a marly clay resting on alternate beds of earth and shingle, is very productive in wheat, rye, maize, buckwheat, hemp, &c. On the plateau the soil is calcareous and shallow; it yields barley, oats, maize, nuts, &c. Potatoes also are an important crop. Among the mountains the soil is stony and thin, though some barley and oats are produced; but there is abundant pasture, on which during summer, from June to October, great numbers of cattle and horses are fed. During that season the chalets, or solidly constructed huts, on the heights serve as habitations for the herds, stores for the dairy produce, and as sheds for the cattle; in these the cows are milked and butter and cheese are made. On the 9th of October (St. Denis' Day) the little establishments are all broken up, for then or soon after the rigours of a boisterous winter set in; the herdsmen tie their wardrobe, no great burden, between the horns of the best cows, and the descent to the various villages is commenced. In these annual migrations of the cattle, the milking and the cheese and butter-making are entirely managed by men. An account is kept of the quantity of milk given by the cows of each owner, so as to apportion a just share of the butter and cheese, or of their price when sold. The farm buildings in the mountain districts are solidly built of stone and lime, but only 7 feet high, and covered with lengths of split fir, which are kept from being blown away by numerous stones laid on them. They include a dwelling-house, stable, barn, and hayloft, all under the same roof, and communicating with each other. All the animals lair in the same stable, which extends quite across the building. In that part of the structure appropriated to the family the chief apartment is about 13 feet square; in the centre stands a stove, whence the smoke issues through a tube carried up a wide chimney, which by means of a trap-door is kept closed on the windy side, and serves for a window all the year, and during the deep snows for a door also, the ascent being made by a short ladder.

Rivers.—The department is drained by a great number, the principal being—the *Ain*, the *Doubs*, the *Oignon*, which bounds it on the north, and the *Loue*, which enters it from the department of Doubs, and running west enters the river Doubs, a few miles south of Dôle. Of these the *Ain*, the *Loue*, and the *Doubs* are navigable. Among the smaller rivers the most important are the *Bienne*, the *Cuisance*, and the *Furiense*. The north of the department is crossed by the *Canal du Rhône-au-Rhin*. There are numerous marshes and lakes in the department.

Climate.—The climate is cold in the mountains, where the snow lies for six months; in the plain, which is cold enough in winter, owing to the proximity of the snow in the highlands, the air is hot and close in summer, but on the plateau pure and healthy. High winds are frequent at all seasons; they are attended by heavy rains in spring, and oftentimes in summer also.

Natural Products, &c.—The agricultural produce is sufficient for the consumption. Horned cattle are exceedingly numerous; there are but few sheep; poultry, bees, game, and fish are abundant. The produce of wine amounts to 9,000,000 gallons annually, the best growths being those of the districts about *Arbois*, *Château-Chalon*, and *Lons-le-Saulnier*.

Several iron mines are worked; gold, copper, lead, and coal are found; the peat beds are dug for fuel; marble, gypsum, alabaster, and lithographic stone are quarried. There are important salt-works at *Salins* and *Montmorot*. The manufacture of iron and iron wares is the most important object of industrial activity. The other manufactures are paper, watch and clock works; turnery in wood, bone, ivory, and horn; coarse woollens, linen, mineral acids, salt, casks, steel, scythes, nails of all kinds, tiles, and leather. The department is divided into the four *arrondissements*, *Lons-le-Saulnier*, *Poligny*, *St. Claude*, and *Dôle*. The capital of the department is *Lons-le-Saulnier*.

JURA MOUNTAINS, the name given to a mountain system which consists of several parallel chains extending along the frontiers of France, Savoy, and Switzerland, in a direction south-south-west to north-north-east from the Rhône and the Lake of Geneva to the left bank of the Rhine, towards the north, where it is connected by some lower elevations with the *Vosges*. The length of the system is about 180 miles; the breadth varies from 30 to 50 miles. The highest summits of the *Jura Mountains* are found in the most eastern chain, which is connected with the *Bernese Alps* and extends between France and Switzerland; the other chains diminish in height towards the west, and do not form continuous unbroken ranges, but rather consist of isolated elevations, connected at their bases. Very few of the valleys among these mountains are transversal; most of them run in the direction of the length of the chains. The highest points in the crest of the eastern chain are those of *Reculet*, *Tendre*, *La Dôle*, and *Colombier*, which rise respectively to 5643, 5512, 5507, and 5194 feet above the sea-level; the mean height of this chain is about 4800 feet. The highest point in the second chain does not much exceed 4300 feet. The highest part of these mountains, which is fully 3000 feet lower than the line of perpetual snow on the Alps, is covered with forests of pine and other resinous trees; further down, the beech, the ash, the lime, and the oak flourish; and the lower slopes are occupied with vineyards or cultivated for the production of maize or barley. The mountains also abound in excellent pasture, on which great numbers of cattle are reared and fed, and a great quantity of cheese is made. Wolves are common; the brown bear and the wild cat are said to be met with, but rarely.

On the eastern side the chains of the *Jura* present in general steep abrupt flanks, but on the west they slope down by almost insensible degrees. They are composed of a hard gray limestone, mixed with alternate beds of marl

and clay; in some places alabaster, gypsum, asphalt, coal, marble, and petrifications of various kinds, especially those called *oolites*, are found. Iron mines and sulphurous and salt springs abound; stalactitic grottoes and waterfalls are numerous; among the latter is the magnificent *Saut du Doubs*. An important and interesting feature of the *Jura* system, which gave name to the *Jurassic* formation, is the number of erratic stone blocks that are found high up the eastern slopes, at points opposite the opening of the great valleys which descend from the high Alps. Various theories have been proposed to account for the appearance of these massive blocks of a different kind of stone to that which prevails in the *Jura*; of these the theory of *Venturi* and *Agassiz*, who respectively ascribe the transfer of these blocks to floating ice and to glaciers at some long-distant epoch, seems the most probable.

JURASSIC PERIOD is so called from the *Jura Mountains* in Switzerland, where a large development of the strata of this period has been elevated, crumpled, and folded into vast synclines and anticlines. From these the present range has been carved out; it is almost entirely composed of *Jurassic* rocks. The *Jurassic* period is a subdivision of the *Mesozoic* era, and occupying as it does a medial position, in it the various characteristic *Mesozoic* animal forms reached their culmination. In England the *Jurassic* system attains a development of about 4000 feet. It embraces the *Lias* and *Oolitic* formations. Its outcrop stretches in a broad irregular south-west and north-east band across the centre of England from *Yorkshire* on the north to the coast of *Dorset* on the south, the strata dipping gently eastward. The *Lias* below rests along the greater part of the north-west boundary on the *Trias*, but in some cases it overlaps these and rests unconformably on *Carboniferous*, or even on *Silurian* rocks; this, exclusive of palæontological evidences, shows a break in the succession which separates the *Jurassic* from the *Trias*. The *Oolite* below passes, in some parts of the south of *Dorset*, into the *Purbeck* beds, and through them into the *Wealden* formation; but for the most part it is succeeded unconformably by the *Cretaceous*, which in *Devonshire* overlaps the whole *Jurassic* and rests on *Trias* west of *Azminster*. In *Yorkshire* the *Cretaceous* overlaps the *Oolite* and rests on the *Lower Liasic* beds.

The divisions of the *Jurassic* are subdivided up palæontologically, and each of these subdivisions is composed of lithological members that have received special names. The classification of the *Jurassic* is as follows:—

OOHITE.

Upper or Portland—*Purbeck* beds (passage beds);

Portland beds; *Kimmeridge* clay.

Middle or Oxford—*Coral rag*; *Oxford* clay.

Lower or Bath—*Corinthian*; *Forest* marble; *Great Oolite*; *Stonesfield* slate; *Fuller's earth*; *Inferior Oolite*.

Lias.

Upper *Lias*; Middle *Lias* or *Marlstone*; Lower *Lias*.

The *Lias* consists mostly of beds of blue argillaceous limestone (largely used for hydraulic lime), calcareous clays, and some sandy beds. In East Scotland the beds are less calcareous and more estuarine in character; plant remains and coal seams occur. In *Yorkshire* about *Cleveland* a workable bed of ironstone is found. Each subdivision of the *Lias* has its zone of characteristic *Ammonites*; but the series is specially remarkable for the abundance and size of the reptilian remains.

The *Oolite* series consists largely of thick beds of pure cream-coloured limestone, many of them *oolitic* (hence the name), with intervening bands of clay. The whole series was investigated by *William Smith*, who retained the local provincial names for each lithological division. It was on the study of these strata that *Smith* founded the principles

of stratigraphical geology. In Yorkshire, Lincoln, and Northampton the lower beds to the Cornbrash are partly of fresh-water and terrestrial origin, coal measures with bands of coal and plant remains being found. Again at Brora in Sutherland, Scotland, a similar coal series occurs.

Jurassic rocks probably underlie most of the newer rocks of the east of England. They were cut in the Weald boring (Kent); but in the neighbourhood of London they are known to be absent, borings having passed from the Cretaceous into the Palæozoic. Outlying patches of Jurassic rocks in the British Isles are, in East Scotland, Lias; at Brora, Sutherland, Oolites; Lias and Oolites among the Inner Hebrides; and Lias beneath the basalts of Antrim, Ireland. There is a small patch resting unconformably on Trias, near Carlisle.

On the Continent of Europe Jurassic beds underlie the Cretaceous and Tertiary basin of the north of France, the plains of north Germany, and Central and Eastern Russia. They occur highly inclined and folded in the mountain ranges of the Jura, the Alps, and the Apennines. They are also found in Bohemia and in Spain. In India, Australia, New Zealand, and many neighbouring districts Jurassic fossils have been recognized. In North America the Jurassic are not very distinctly separated from the Trias, the two apparently forming a continuous series. They are, however, specially interesting from the occurrence in them of remarkable bird-like reptilians.

The flora and fauna of Jurassic times is typically Neozoic; the old forms have either disappeared or are only represented by a few straggling representatives. Among plants, ferns, cycads, and conifers abound; gymnosperms are the predominant race. Among the Invertebrata, Spermataceans have replaced the Quadripartita. Lamellibranchs exceed the brachiopods; the genera *Trigonia*, *Gryphaea*, and *Exogyra* are abundant. The genus *Ostrea* (the oyster family) first appears in the Jurassic. The last of spirifers and *Liptæna* (brachiopods) go out with Lias. Cephalopods culminated in this period, both in numbers and in diversity of form; the tetrabranchs, or shelled division of the class, are represented by the Ammonites, which were extremely numerous, and varied in size from about half an inch to 3 or 4 feet in diameter. The dibranchs, or naked division, are represented by the Belemnites, which were introduced here; the portion of them preserved is the phragmocone; some large specimens have been found 3 or 4 inches in diameter, and 2 feet long. Reef-building corals are abundant. Insects are not uncommon in the Jurassic; crustacea and fishes continue, though in altered forms. The most remarkable features of the period are the abundance, the peculiar forms, and the gigantic size of the reptilian remains. Of these there are three distinct divisions—Enaliosaurians, Dinosaurians, and Pterosaurians, ruling respectively in the sea, land, and air. Ichthyosaurians, Plesiosaurians, and Mosasaurians were well adapted for aquatic life; the remains of numerous species have been found. At Lyme Regis, in Dorsetshire, well-preserved skeletons occur, many of them of beasts upwards of 50 feet in length. The DINOSAURIA were huge land reptiles of high organization; many of them were either bipeds or had the power of erecting themselves on their hind legs. The *Archæopteryx* was over 14 feet high, standing on its hind legs. The *Megalosaurus* was probably one of the largest beasts that ever existed; remains have been found that must have belonged to a beast 60 or 70 feet long and 10 feet high. Allied to this species is the *Atlantosaurus*, found in Jurassic beds in Colorado. This animal is supposed to have measured about 100 feet in length, and to have been about 30 feet in height. Many of these have most remarkable bird-like affinities, as the *Compsognathus*. Of flying reptiles the most remarkable genera are the *Pterodactylus* and the *Rhamphorhynchus*. In the Jurassic beds of Solenhofen the earliest bird remains have been

found—the *Archæopteryx*; this beast had a long jointed feathered tail and four separated digits on the wing. Mammals were in all probability tolerably abundant in Jurassic times: in the Stonesfield slate the remains of four genera have been found, and in the Purbeck a number of lower jaw-bones have been discovered, probably representing about twenty species. They were mostly marsupials, but some of the remains are considered to be those of higher mammals.

The physical geography of Great Britain in Jurassic times is thus described by Sir A. C. Ramsay:—

"The remarkable assemblage of large Reptilia that inhabited the Liassic seas, the number of great and small Cephalopoda, including many species of Ammonites, Nautili, and Belemnites, the swarms of Terebratulæ and Rhynchonellæ, the plentiful genera and species of lamellibranchiate molluscs, and of univalve shells, all speak of warm seas surrounding islands on which grew cycads, zamias, and other plants, that seem to tell of a tropical or sub-tropical climate." The land areas during this period were probably small islands, now represented by the older rocks of Cornwall, the highlands of Wales, of Cumberland, and of Yorkshire. A larger land area probably lay where Scotland now is; much of Ireland also was above the Jurassic sea.

"In the south of what is now England the seas were broad and comparatively shallow during all the time of the deposition of the Lower Oolites, and the islands round which these seas flowed (including Wales) were comparatively small. But further north we come to a fragment of a much larger land, formed of Palæozoic rocks, that in those days formed a mountainous country extending from the hills of Derbyshire far away to the north extremity of Scotland, and how much further entire or broken into islands no man yet knows. In spite of disturbances of upheaval of later date than those Oolitic times, it may also very well have been that this old land was much higher than the highest highland mountain of the present day, seeing the vast amount of waste and degradation that they have undergone since that ancient time, and we may be sure that it was surrounded by seas of this lower Mesozoic epoch, for fragments of the Oolitic strata still surround the island. This was the larger land from which the rivers flowed that deposited the fresh-water sands described above. On the low banks of these rivers grew many a plant now represented by merely indistinct impressions—

‘Their meaning lost,
Save what remains on stone, or fragments vast’—

in which the relics of species of *Aracaria*, *Cycas*, *Zamia*, *Screw Pine*, and numerous other forms, together with gigantic Equisetums which grew in the still waters on their borders, while marsupial mammals on the shores, and *Trigonia* and Terebratulæ in the seas, help us to realize that the physical characteristics of the time in some degree resemble those of Australia in our own day, a circumstance first noticed by Professor Owen.

"This state of affairs was at length partly brought to an end by a gradual submergence, during which the Oxford and Kimmeridge clays were deposited in open seas, but the sinking of the area was not by any means so great as to swallow up the old islands round which the strata were formed, and which still remain, much changed, as the most lofty portions of Great Britain."

JURISDICTION. This term is the Lat. *jurisdictio*, which simply signifies the declaration of *jus* or law. He who had *jurisdictio* was said *jus dicere*, to declare the law. The whole office (*officium*) of him who declared the law was accordingly expressed by the word *jurisdiction*. (Dig. 2, tit. "De Jurisdictione.") *Jurisdictio* was either voluntary (*voluntaria*) or litigant (*contentiosa*). The "*jurisdictio voluntaria*" related to certain acts, such for instance as those

forms of manumission and adoption which must be done before a *magistratus* in order to be valid. The "*jurisdictio contentiosa*" related to litigation, and such legal proceedings were said to be *in jure*, before the *magistratus*, as opposed to the proceedings before a *judez*, which were said to be *in judicio*. The *magistratus* was said *jus dicere* or *reddere* when he exercised his functions; and "*magistratus*" and "*qui Romæ jus dicit*" are accordingly convertible terms.

Jurisdiction in England means the jurisdiction of Parliament, which is, according to Sir Edward Coke, most capacious, and according to other writers omnipotent; and it also means the extent of authority which a court of justice has to decide matters that are brought before it for litigation, or questions that are brought for trial.

In our article on the JUDICATURE ACT we have shown that one of the chief reasons for the passing of that important measure was the great inconvenience occasioned by the separate jurisdictions of law courts and equity courts. The superior courts of law could often only do partial justice to a case, by reason of their jurisdiction being limited to the hard and fast line of the point of law in the case before them; and justice was often thwarted by the discovery that a court in a particular case had exceeded its jurisdiction, and however just and right the decision, it was practically useless on this account, having no binding authority. The Judicature Act of 1875 abolished these anomalies, by giving to each division of the High Court of Justice equal jurisdiction in all cases—removing, in fact, all the old distinctions between courts of law and equity.

A limited jurisdiction in equity is given to county courts, and the powers vested in these useful tribunals have been attended with the best results to suitors and all concerned.

In Scotland the same tribunals have, from a very remote period, administered both law and equity much as since the Act of 1875 is the case in England. It may be noticed, however, that before the Union the old Scotch Privy Council assumed a power to interfere with and control the action of the common law to an extent unknown in England, except perhaps in the court of Star Chamber, now long abolished.

JURISPRUDENCE, from the Lat. *jurisprudentia*, which signifies a knowledge of law. Persons who were skilled in the law were called by the Romans *jurisprudentes* or simply *prudentes*, and sometimes *jurisconsulti*. Jurisprudence means more than being simply acquainted with the rules of law as they exist in any given system; it means such an acquaintance with them as implies a knowledge of the law as a whole or system, a knowledge of the several parts, of their relation to one another and to the whole. The Roman *jurisprudentes*, who were writers on law, gave to the several rules of law which related to any given division of the whole matter a certain order and consistency; they developed, and explained, and arranged that which existed as an incoherent mass. Their influence on the development of law was great, both directly and indirectly; and the compilation of Justinian called the "*Digest*" or "*Pandect*," which is entirely composed of extracts from the writings of the Roman jurists, gave to their opinions the force of law in the Roman Empire. The Roman jurists also wrote institutional or elementary treatises on that part of the law which they called *Privatum Jus*, of which the "*Institutiones*" of Gaius are an example.

Jurisprudence generally, or general jurisprudence, is conversant about those principles which are inseparable from all systems of law, or common to all systems of law; for however systems of law may differ in fact, and however much they may appear to differ in form, there are fundamental principles which are common to all. The notions of possession, of property, of things which can be objects of property, of most of the ordinary contracts of life, of

testaments, of intestacy, and the like, are essentially the same. The notions of person, natural and artificial, of right, of duty, and many other things, are universal, and necessarily the same. It is the business of general jurisprudence to explain all these common notions, and to reduce the whole matter which they comprehend to some general form or system, with which all particular systems of positive law may be compared. This has been done in various ways by different writers, but the best examples that we have are by the German writers on law. When general jurisprudence becomes a regular part of a law-student's discipline, it will lead to a more comprehensive study of the matter of our own law, to a more correct conception of its parts and their relations to one another, and consequently to a nearer approximation of the particular law of England to the true measure or standard of general law in those cases in which our particular system deviates from it. The study of general jurisprudence would be a sure though a slow corrective of many of the evils under which our actual society suffers.

The best English work on this subject is J. Austin's "*Province of Jurisprudence Determined*" (London, 1832), with its "*Sequel*" (London, 1861-63). See also the works of Bentham, J. S. Mill, and Sir H. S. Maine.

JURY is an assembly of men authorized to inquire into or to determine legal facts, and bound by an oath to the faithful discharge of their duty. The etymological derivation of the term is obviously from *jurare*, to swear, whence we find this institution called in law Latin *jurata*, and the persons composing it *jurati*; in French *les jurés*, and in English *the jury*. In English law, when the object is to inquire only, the tribunal is sometimes called an inquest or inquisition, as in the instance of a grand jury or coroner's inquest; but when facts are to be determined by it for judicial purposes, it is always styled a jury. When the trial by jury is spoken of in popular language at the present day, it signifies the determination of facts in the administration of civil or criminal justice by twelve men sworn to decide them truly according to the evidence produced before them.

Inquiry into facts on behalf of the crown by means of juries was frequent in England long before the trial by jury was commonly used in courts of justice for judicial purposes. Besides these juries of inquiry (*inquisitoria jurata*), there were accusatory juries (*jurata delictoria*), who presented offences committed within their district or hundred to the king or his commissioned justices. These inquests were immediately connected with the administration of justice, their duty being to charge offenders who, upon such accusation, were put upon their trial before judges, and were afterwards condemned or delivered by them according to the result of the trial. Though the character and duties of these accusatory juries are involved in much obscurity, there is little doubt that they formed the origin of our present grand juries. The number of persons composing juries of inquiry and accusatory juries was arbitrary, and might consist of more or occasionally of fewer than twelve men.

The third species of jury is the institution by which disputed facts are to be decided for judicial purposes in the administration of civil or criminal justice, and which is in modern times familiar to us under the denomination of *trial by jury*. The time at which this species of trial originated in England has been the subject of much discussion; and the question, whether it was known to the English before the Norman Conquest, or was introduced by William the Conqueror, has been warmly debated.

The traces of trial by jury, in the form in which it existed for several centuries after the Conquest, are more distinctly discernible in the ancient customs of Normandy than in the few and scanty fragments of Old English laws which have descended to our time. The trial by twelve

compurgators, which was known to the English from the earliest times, and also to many foreign nations, resembled the trial by jury only in the number of persons sworn. Besides this, the trial by compurgators, under the name of Wager of Law, continued to be the law of England until it was abolished, in 1833, by the statute 3 & 4 Will. IV. c. 42, s. 13, and is treated by all writers, and noticed in judicial records ever since the Conquest, as a totally different institution from the trial by jury. The trial *per sectatores* or *per pares* in the county court, which has sometimes been confounded with the trial by jury, was in truth a totally different tribunal. The sectatores or pares were, together with the sheriff or other president, judges of the court, as are the suitors in the county courts at the present day. But the incidents of the mode of trial prevalent in Normandy long before the Conquest correspond in a striking manner with those of our trial by jury as it existed for centuries afterwards. Thus in Normandy offenders were convicted or absolved by an inquest of good and lawful men summoned from the neighbourhood where the offence was surmised to have been committed. The law required these to be selected to serve on such inquest who were best informed of the truth of the matter; and friends, enemies, and near relatives of the accused were to be excluded. These incidents, though unlike our present mode of trial, are nearly identical with the trial by jury as it is described first by Glanville and afterwards by Bracton, and correspond almost verbally with the form of the jury process which has continued to the present day, by which the sheriff is commanded to return good and lawful men of the neighbourhood, by whom the truth of the matter may be better known, and who are not akin to either party, to recognize upon their oaths, &c. On the other hand (as Madox remarks in his "History of the Exchequer," p. 122), "if we compare the laws of the Anglo-Saxon (*i.e.* Old English) kings with the forms of law process collected by Glanville, they are as different from one another as the laws of two several nations."

Though there are some traces of the trial by jury in the four reigns which immediately succeeded the Norman Conquest, it was not till a century afterwards, in the reign of Henry II., that this institution became fully established and was reduced to a regular system. The law of Henry II. introduced the trial by assize or jury in real actions, as a mode of deciding facts which the subject might claim as a matter of right. In the reign of John we first begin to trace the use of juries for the trial of criminal accusations. It is quite clear, however, from Bracton and Fleta, that at the end of the thirteenth century the trial by jury in criminal cases had become usual, the form of the proceedings being given by them in detail (Bracton, p. 113). Introduced originally as a matter of favour and indulgence, it gained ground with advancing civilization, gradually superseding the more ancient and barbarous customs of battle, ordeal, and wager of law, until at length it became, both in civil and criminal cases, the ordinary mode of determining facts for judicial purposes.

It is a popular error that the stipulation for the *judicium parium* (or judgment by equals) in Magna Carta referred to the trial by jury. Coke, in his commentary upon Magna Carta, expressly distinguishes between the trial by peers and the trial by jury (2nd Inst. 48, 49); but Blackstone says—"The trial by jury is that trial by the peers of every Englishman, which, as the grand bulwark of his liberties, was secured to him by the Great Charter" ("Commentaries," vol. iv., p. 349). This is confounding two distinct modes of trial. The *judicium parium* was the feudal mode of trial, where the *pares*, or *conrassalli ejusdem domini*, sat as judges or assessors with the lord of the fee to decide controversies arising between individual *pares*.

Until about the reign of Henry VI. the trial by jury was a trial by witnesses. The present form of the jurors' oath

is that they shall "give a true verdict, according to the evidence." At what precise time this form was introduced is uncertain; but for several centuries after the Conquest, the jurors both in civil and criminal cases were sworn merely to *speak the truth*. Hence their decision was accurately termed *verdictum* (true speech), or verdict; whereas the phrase "true verdict" in the modern oath is not only a pleonasm, but is etymologically incorrect, and misdescribes the office of a juror at the present day. The earliest traces of the examination of witnesses or of evidence being laid before juries in England, which formed the commencement of a total change in their character, occur in the reign of Henry VI. The change was introduced by slow degrees, and though distinctly discernible in the reign of Henry VI., was not completely effected before the times of Edward VI. and Mary.

The juries now in use in England in the ordinary courts of justice are grand juries, petty or common juries, and special juries. Grand juries are exclusively incident to courts of criminal jurisdiction; their office is to examine into charges of crimes brought to them at assizes or sessions, and if satisfied that they are true, or at least that they deserve more particular examination, to return a bill of indictment against the accused, upon which he is afterwards tried by the petty jury. A grand jury must consist of twelve at the least; but in practice a greater number usually serve, and twelve must always concur in finding every indictment. No further qualification is required for grand jurors (except in the case of grand jurors at the sessions of the peace, provided for by the Jury Act) than that they should be freeholders, though to what amount is uncertain; or freemen, lawful liege subjects, and not aliens or outlaws.

Until the end of the thirteenth century the only qualification required for petty or common juries, for the trial of issues in criminal or civil courts, was that they should be "free and lawful men;" *freemen*, as holding by free services or free burgesses in towns; and *lawful men*, that is, persons not outlawed, aliens, or minors, but entitled to the full privileges of the law of England. The statute 6 George IV. c. 50, entirely remodelled the law respecting juries. By this statute "every man (with certain specified exceptions) between the ages of twenty-one years and sixty years, who has within the county in which he resides £10 a year in freehold lands or rents, or £20 a year in leaseholds for unexpired terms of at least twenty-one years, or who, being a householder, is rated to the poor-rate in Middlesex on a value of not less than £30, and in any other county of not less than £20, or who occupies a house containing not less than fifteen windows, is qualified and liable to serve on juries in the superior courts at Westminster and the courts of the counties palatine, for the trial of issues to be tried in the county where he resides, and also to serve on grand juries at the sessions of the peace, and on petty juries, for the trial of issues triable at such sessions in the county in which he resides." The exceptions are—peers, judges of the superior courts, clergymen, Roman Catholic priests, dissenting ministers following no secular employment but that of a schoolmaster, serjeants and barristers-at-law, and doctors and advocates of the civil law actually practising; solicitors actually practising and their managing clerks; officers of courts actually exercising the duties of their respective offices; coroners, jailers, and keepers of houses of correction; members and licentiates of the College of Physicians actually practising; surgeons, being members of one of the royal colleges of surgeons in London, Edinburgh, or Dublin, and actually practising; apothecaries certificated by the Apothecaries' Company, and actually practising; officers in her Majesty's navy or army on full pay; pilots licensed by the Trinity House; masters of vessels in the buoy and light service; pilots licensed by the Lord Warden of the Cinque Ports,

er under any Act of Parliament or charter; household servants of the sovereign; officers of customs and excise; sheriffs' officers, high constables, and parish clerks.

With respect to special jurors it was provided by the Jurors Act of 1870 (33 & 34 Vict. c. 77) that every man whose name shall be in the jurors' book for any county in England or Wales, &c., and who shall be legally entitled to be called an esquire, or shall be a person of higher degree, or a banker or merchant, or who shall occupy a house rated at £100 in a town of 20,000 inhabitants or upwards, or at £50 elsewhere, or who shall occupy premises rated at £100, or a farm of £300, shall be liable to serve.

Any party to an action triable by any of the superior courts is entitled to have the cause tried by a special jury. Formerly a fee of only a guinea was awarded to such juror, however long the trial, but the judge can now award that sum for every day's attendance; the parties to the suit having to deposit such a sum beforehand as the court may determine, from which this payment is made. The new statute did not provide for the payment of jurymen in criminal cases, but a special allowance is sometimes made, as in the great Tichborne trial of 1873-74, which lasted 190 days, and for his attendance at which each jurymen received a fee of 300 guineas from the Treasury.

Lists of all persons qualified to be jurors are made out by the churchwardens and overseers of each parish, and fixed on the church door for the first three Sundays in September in each year; these are afterwards allowed at a petty sessions, and then delivered to the high constable, who returns them to the next quarter-sessions for the county. The clerk of the peace then arranges the lists in a book, which is called the "Jurors' Book" for the ensuing year, and afterwards delivers it to the sheriff. From this book the names of the jurors are returned in panels to the different courts. Under the Jurors Act of 1870 (33 & 34 Vict. c. 77) no juror can be summoned more than once in a year, unless the whole list has been gone through; and all jurors must have six days' notice before being summoned.

The mode of objecting to a jury by the parties is by challenge. Challenges are of two kinds: challenges to the *array*, and challenges to the *polls*. The challenge to the array is an objection to the whole panel or list of jurors returned for some partiality or default in the sheriff or the under-sheriff by whom it has been *arrayed*. Challenges to the polls are objections to particular jurors, either on the ground of incompetency (as if they be aliens, or of insufficient qualification within the provisions of the Jury Act, 6 Geo. IV. c. 50), or of bias and partiality, or of infamy, as having been convicted of some infamous crime. Upon these challenges the cause of objection must in each case be expressly shown to the court; but in trials for capital offences the accused is entitled to challenge *peremptorily* (that is, without giving any reason) thirty-five jurors. The king, however, as nominal prosecutor, has no right of peremptory challenge, though he is not compelled to show his cause of challenge until the panel is gone through, and unless a full jury cannot be formed without the person objected to. One of the jury is appointed the foreman, and he generally delivers the verdict of the jury to the judge in court. Both special and petty juries are composed of twelve persons, a county-court jury of five, and a coroner's jury of any number over twelve. In all civil and criminal cases a unanimous verdict is required, but in coroners' juries, though the finding must be that of twelve at least, unanimity is not required. Women are impanelled as a jury in two cases only, in a writ *de ventre inspiciendo*, and where a female prisoner condemned to be executed pleads pregnancy as a ground to postpone the completion of her sentence. The privilege which an alien was formerly entitled to claim, of being tried by a jury composed half of foreigners and half of natives, has been abolished by the Naturalization Act (33 Vict. c. 14, s. 5).

The trial by jury, established in France in criminal cases by the National Assembly, was retained in the French code. [See CODE.] An account of the proceeding and of the qualifications and formation of the jury will be found in the "Code d'Instruction Criminelle," ii. 2, chaps. iv., v.

In Scotland the rule is that all offences shall be tried by jury unless such as are of a minor kind and in the nature of police offences. The criminal jury consists of fifteen men, who return their verdict by a majority. The only exception is in the case of treason, where the English procedure by *oyer and terminer* may be followed. In that case the jury consists of twelve, and the verdict must be unanimous. In civil causes jury trial was anciently the ordinary mode of procedure, but was gradually superseded, under the influence of French example and the extension of the jurisdiction of the ecclesiastical courts. After the institution of the Court of Session it was entirely disused, except in the cases of *briefes* issuing out of Chancery to the sheriff to be tried by an inquest. In 1815 jury trial was reintroduced by 55 Geo. III. c. 42, and a separate court, called the jury court, established for the purpose. By further legislation the institution was greatly extended and ultimately incorporated with the ordinary jurisdiction of the Court of Session. The civil jury is twelve, as in England, and originally the verdict was required to be unanimous; but by 31 & 32 Vict. c. 100, s. 48, it may now be returned by a majority at any time not less than three hours after the jury have been impanelled. If after six hours they are still equally divided they may be discharged, and a new trial ordered. Before amalgamation of the jury court with the Court of Session, cases were tried by certain judges holding special commissions for that purpose. Since that time trials may proceed before any of the judges of the Court of Session. At an early period civil causes were often tried by jury in the sheriff courts, but this fell into entire disuse during the course of the seventeenth century, except in so far as inquests on the *briefes* were concerned. Even these are now abolished. There is no such thing as a coroner's jury in Scotland, because there is no coroner; nor is there a grand jury, unless in cases of high treason.

JURY MAST, a mast erected in a ship to supply the place of one carried away by some injury in a tempest or in an engagement. It would seem as if the derivation were through corruption of *injuria-mast*, but against this there is the awkward difference of accent. The point is much debated.

JUSTICE has been defined as the virtue which consists in giving every one his due, and this definition fairly conveys the root-idea contained in the term, although in practice it is used to convey many different concepts.

The sentiment of justice is very deeply rooted in the mental and moral nature of man, of which it may be said to constitute an essential part. Whatever may have been its origin, the sentiment itself is recognized by all races of men, savage and civilized alike, and we may easily see that human society would be impossible without it. Justice stands first among the social virtues of mankind. While, however, we are bound to recognize the existence of this sentiment as an essential constituent of human nature, we learn, alike from history and experience, that the knowledge of the nature and requirements of justice now possessed by the wisest and best is the result of long experience and of many experiments in thought and practice. The notion of justice possessed by primitive races differs very greatly in its extent and limitations from that which has been acquired by races more advanced, and the difference extends to every department of thought and practice affected by it. This may be seen readily when we consider the sentiment of justice as it influences the theological conceptions, the political and social life, and the individual conduct of men. Thus in human conceptions of the deity we find that the

characteristics of the worshippers are very largely reproduced in the god that is adored or feared. In primitive religions we find each nation has its patron deities, who are expected to favour it in all respects in its contests with others, but each member of the nation being a servant of the national god has in some way the right of appeal to him. With the growth of social life and the enlargement of the notion of justice, men began to regard it as an attribute of the gods, and all nations that have reached a high degree of civilization have had a deity who was the fountain of justice and its especial protector. In the books of the Old Testament, where we have a most interesting history of the religious growth of a nation, we are able to trace how the primitive conceptions of a tribal deity became enlarged through the teachings of the prophets until the Jew was able to worship in Jehovah the God of perfect justice, who was not to be bribed by sacrifices nor deceived with words, but who would rightly judge all his servants, and reward them according to their works.

The notion of favouritism, however, still remained, and notwithstanding the teaching of the New Testament it passed also into Christianity, and it still remains both with Jew and Christian, affecting seriously the conceptions of divine justice. Probably all Christian teachers would readily assent to the proposition that we must ascribe perfect justice to God, but it would be difficult to find any system of doctrine that does not either assert or imply conceptions of his dealings which cannot be reconciled with this attribute. When, however, we turn from doctrinal teaching to the practical aspect of religion, it is evident that confidence in divine justice forms one of its firmest foundations. The feeling that God must be just to all his creatures alike gives dignity to life and strength to character, and it is also a source of confident trust and hope.

Turning to the consideration of the conception of justice as regulating national and political action, we are confronted with the fact that up to the present no nation has attempted to profess to make justice its rule. Within a nation the citizens may submit their personal claims to the consideration of others, and consent to be ruled in accordance with the laws which have been accepted as an approximation towards justice. But when it becomes a question of dealing with other nations, the appeal is more often to "first law" than to any commonly accepted notion of justice. Men admire the statesman who advances the power and position of his country, even though this advance is attained by encroaching upon others, and they regard with distrust one who is supposed to consider justice first and country afterwards. This is especially the case in all dealings with nations that are less civilized, and inferiority in this respect is continually advanced by politicians as a justification for conduct which would be regarded as intolerably unjust if it was pursued under other circumstances. This applies not only to the questions of war and peace, the extension of government, and the acquisition of territory, but also to matters of trade, commerce, and finance, in all of which we find national aggrandizement continually advocated, the consideration of its justice being absolutely ignored. By many thoughtful men, however, it has been perceived that the true interests of men are identical, notwithstanding all divisions of nation and race, and further, that it is only when justice is sought after that these interests can be realized; and though ideas make but slow progress, it may be hoped that in course of time men will perceive that international justice is absolutely necessary for national well-being.

In social life the sentiment of justice has made greater progress, and the results already attained may be taken as pointing to yet greater developments in the future. To so order national life as to insure equal rights or justice to all is a task of enormous complexity and difficulty; but it is something to have reached a stage of progress where

this is recognized as desirable, and where men can confidently appeal to the sentiment of justice in advocating reforms. When we survey the past and endeavour to realize modes of life that have long passed away, we see that many kinds of injustice which once were quietly accepted, and the evil of which was unperceived, have been already completely conquered in civilized nations. It was but recently that thoughtful men defended serfdom and slavery as just, but comparatively few would so defend them now. It is plain also to every thinker that in our present condition many laws and customs are supported which in their nature are essentially unjust, though from habit and ignorance men generally are unable to perceive this; but the triumphs of justice already accomplished in the past indicate that the present evils may also be conquered and overcome, and that the principle is capable of indefinite development.

Finally, in respect to personal character, without the element of justice all other qualifications become of little value. All men, whatever their own conduct may be, revere one who in all things strives to be just. In ancient history we read of men who exercised immense influence among their fellows, because they were just men, men who recognized a higher law than that of expediency, and upon whose fidelity to justice others could with confidence depend. The books of the Old Testament contain many passages which enjoin justice or praise men for being just, and the same virtue receives equal commendation in the books of the New.

JUSTICES' CLERK. the name given in England to an officer who is appointed by the justices of the peace to assist them in their duties. Although the justices are called upon to administer many departments of the law, and to interpret Acts of Parliament, &c., they are commonly chosen from those who have had no legal training or education. Hence the necessity for the services of an experienced lawyer to guide them in their decisions, and this is obtained by the appointment of a justices' clerk, who under the form of advice is allowed to regulate the proceedings of the court. The appointment is paid by fees, which are regulated by several statutes, and it is usually given to a local solicitor of good reputation.

JUSTICES, LORDS. From the time of the Norman Conquest until a recent period it was customary for the sovereign of England, whenever he left the kingdom, to appoint one or more persons to act for a time as his substitute in the government, and such persons were termed lords justices. When William I. returned to Normandy the year after the Conquest he left his half-brother Odo, bishop of Bayeux, and William Fitzherbert, to be *custodes regni*, or guardians of the realm, during his absence; and similar appointments were very frequent under the Norman and Plantagenet kings. Since the Revolution also lords justices and regencies have been repeatedly appointed on occasion of the king going abroad, and the appointment has usually, if not always, been made by royal letters-patent under the great seal. Certain only of the regal functions were intrusted to the lords justices thus appointed, all the more important matters being reserved and submitted to the sovereign. The last appointment of this kind was made by George IV. on his visit to Hanover, when his authority was delegated to nineteen guardians, of whom the heir-presumptive was one. Queen Victoria has never made any appointment of this kind on the occasion of her absences from her kingdom, and her conduct in this matter has been by the advice and with the support of the highest legal authorities of the nation.

In Ireland lords justices have sometimes been appointed to carry on the government in place of the viceroy. In modern times this has only been done in the interval between the demise of one lord lieutenant and the appointment of another, or during occasional absences of the lord lieutenant.

JUSTICES OF THE PEACE are persons appointed to keep the peace within certain prescribed limits, with authority to act judicially in criminal causes, and in some of a civil nature arising within those limits, and also to do certain other things in which they act not judicially but ministerially, i.e. as servants of the crown performing official acts, in respect of which they are intrusted with no judicial discretion. The authority of justices of the peace is derived from the king's prerogative of making courts for the administration of the law, or is created by different statutes; their duties are expressed in the royal commission appointing them to the office, or are prescribed by those statutes.

The appointment of a justice of the peace, which from the social distinction it confers is usually sought after rather eagerly by country gentlemen, is practically in the hands of the lord chancellor, and it is usually granted on the recommendation of the lord lieutenant of the county. It is not avowedly granted in return for political service, but in practice it is found that political considerations are certainly taken into account in the appointment of justices of the peace. Hence these appointments form a frequent source of complaint on the part of the political party that happens to be out of office. The proper qualification for the office is defined by a statute passed in 1875 (38 & 39 Vict. c. 51), by which every person of full age who during the two years immediately preceding his appointment had been the occupier of a dwelling-house assessed to the inhabited house duty at the value of not less than £100, and who is *otherwise eligible*, is to be deemed qualified to be appointed a justice of the peace. If any justice acts without the necessary qualification he forfeits £100. If a justice of the peace is adjudged bankrupt, or compounds with his creditors under the Bankruptcy Act, he becomes incapable of sustaining the office until newly assigned by the crown. By the Act 31 & 35 Vict. c. 18, the law which disqualified attorneys and other lawyers in practice from being justices of the peace for counties was repealed, but the disqualification is retained for the county in which he practises.

Justices of the peace have in general no authority out of the district for which they are appointed, but they may secure the persons of those charged before them with felony or breach of the peace; and in every borough to which a separate court of quarter sessions is not granted, county justices exercise the same jurisdiction as in any other part of the county.

The judicial authority of a justice out of sessions is both civil and criminal—civil, where he is authorized by statute to adjudicate between master and servant, or to enforce the payment of rates, tithes, &c., or the observance of the regulations of friendly societies, &c.; criminal, where he requires surety of the peace or a recognizance for the peace or for good behaviour, or where he acts in the suppression of riots, or where he acts with summary power to decide upon the guilt or innocence of the party accused, according to the view which he may take of the evidence, and to punish the offender. But all proceedings before justices, whether civil or criminal, if removed into the High Court, are there treated as belonging to the crown side of the court. It is impossible here to enter into the particulars of the accumulated authority committed to these magistrates, but the reader is referred to Burns' "Justices of the Peace," the latest edition of which is a complete guide to the subject.

The office of justice of the peace was attempted to be introduced into Scotland by the Act 1587, c. 82, but without success. By the passing of the Act 1661, c. 38, however, a foundation was laid for the introduction of the system; and by the articles of union in 1707, and 6 Anne, c. 6, s. 2, the powers and duties of these magistrates in Scotland are now for the most part assimilated to the law of England on the subject. There is not, however, a *custos*

rotulorum in the Scotch commission, and the *quorum* has never been introduced into the Scotch practice. (Hutcheson's "Justice of the Peace;" Barclay's "Digest;" Dunlop's "Parish Law.")

The institution of justices of the peace has been adopted in most of the British colonies, and has with some modifications been retained in the United States of America.

JUSTICIAR was the title of the highest official in the kingdom of England, whose powers at the time of Edward the Great (Edward I.) passed to the lord high chancellor, who had up till then been his subordinate. The office of lord high chancellor began, however, with Edward the Confessor, whereas the justiciars began only with the Conquest. The first of these powerful viceroys or regents was William Fitz-Osborn, and when we consider that the rulers of England were foreigners whose strongest ties of interest and friendship lay in Normandy and tempted them continually to the Continent, it is evident that in those times of deficient communications the government of our kingdom had to be confided to sure and powerful hands. The justiciar could not on an emergency consult the king, he had to strike at once and boldly at any danger; his power was absolute, tempered only by the stern reckoning exacted of him at the king's next return. Under William Rufus the justiciar became supreme in matters of justice and finance, the king very rarely interfering in either. Under the earlier Angevin kings the continental possessions were far larger, and from their exposed position required far more watchfulness than England, and the justiciar's power was still further consolidated when the King's Court split it into the three branches of the King's Bench, Common Pleas, and Exchequer; however, through the increase and greater classification of business under Henry III., the justiciar's power began to decline, as he was able to preside over only one court, usually the King's Bench. Twice in this reign, in 1214 and 1258, the great council (soon to develop into a Parliament) successfully claimed to appoint the great officers, including even the all-powerful justiciar. In the following reign Edward I. ceased to appoint a justiciar, transferring such of his powers as he desired to depute from himself to the lord high chancellor.

In Scotland a somewhat similar office existed in early times under the same title. Thus we find a justiciar under Malcolm IV. (1133-65) acquiring the title of justice-general, and becoming more legal in his functions about 1500. In 1537 his civil functions passed to the Court of Session, and in 1836 the office merged in that of the lord president of the Court of Session.

JUSTICIARY COURT, in Scotland. The High Court of Justiciary is the supreme criminal tribunal in Scotland. Its jurisdiction extends to all crimes, and includes the whole of Scotland; and no appeal lies from its decisions. The constitution of this court was settled by the Act 1672, c. 16, enlarged and extended by subsequent statutes. At present it consists of the presidents of the two divisions of the Court of Session, and five other lords of session, any three being a quorum. It sits at Edinburgh from time to time during the year, according to the amount of business to be transacted; and holds circuits twice, thrice, or even six times a year at the more important county towns for the more effectual distribution of justice throughout the kingdom. At these circuit courts appeals may be heard from the judgment of inferior judges in criminal cases, inferring neither death nor demeremeration; and also in civil causes where the sum in dispute does not exceed £12 sterling. Civil causes may be tried by jury at the circuit courts to any amount.

In other cases the sentences of inferior judges in criminal causes are brought by bill of suspension or advocacy before the Justiciary at Edinburgh, and in civil cases by appeal or other analogous procedure before the Court of Session.

The jurisdiction of the Justiciary includes the cognizance of the crimes of treason, though these are often tried by a Commission of Oyer and Terminer in the English manner.

When new offences have been created by statute, and even where a special court has been appointed for their trial, it requires the clearest words to exclude the jurisdiction of the Justiciary; it cannot be taken away by implication. No appeal lies from the Justiciary to the House of Lords or to any other tribunal.

JUSTIFIABLE HOMICIDE. See HOMICIDE.

JUSTIFICATION, in theology, is a term derived from the New Testament that is used to signify the acceptance of a sinner by God. The doctrine of justification formed a prominent feature in the teaching of the apostle Paul, as we may see from the accounts of his public utterances recorded in the Acts of the Apostles, and his various epistles, more especially that addressed to the Romans. In view of the enormous mass of controversial literature which has accumulated around the teaching of the apostle on this subject, it would perhaps be too presumptuous to attempt a definition of his doctrine, but speaking generally it may be said to imply that by the expiatory death of Christ a way had been opened by the grace of God, whereby a sinner might be saved and reconciled without offence to the divine attribute of justice. The apostle also indicates that this justification is necessary for all men, Jews and Gentiles alike, that it is freely open to all men without distinction of race or position, that it is to be obtained by faith in Christ Jesus, and that it is followed by holiness and newness of life. The doctrine is approached from another point of view in the Epistle of James, where it is pointed out that the faith that procures justification must be such as shows itself by good works and Christian love.

At the time of the Reformation the doctrine of justification by faith was brought into great prominence by Luther and some of the other leading reformers, and the definition they adopted differs to a considerable extent from that of the Roman Catholic Church. By Protestants generally justification is regarded as a purely forensic act performed by God when he accepts the sinner on account of the imputed righteousness of Christ. By Roman Catholics justification includes not only the receiving of pardon, but the change of character involved in the sinner becoming holy. By Protestant theologians the greatest stress has been laid upon faith as the sole condition of justification, while Roman Catholic theologians in accepting faith as a condition have also insisted upon the necessity of good works in addition. It may be observed, however, that the difference which appears so important in the domain of speculative theology is very greatly reduced in the practical teachings of the opposing systems in respect to the religious life. However the doctrine of justification and sanctification may be defined in theology, both parties are agreed that faith and holiness are alike necessary for salvation.

JUSTINIAN. The Emperor *Flavius Anicius Justinianus* was born near Nardica in Moesia, in 483, of obscure parents, and was nephew by his mother's side to Justinus, afterwards emperor. The name Justinianus was, as its form shows, an adoptive name equal to "adopted son of Justin," and was due to his adoption by his uncle. His own name was Uprauda, and he was probably of Bulgarian, that is, Slavonic origin. *Pranda*, in old Slavic, means *jas* (law), whence probably the Roman name taken by Justinus. The elevation of his uncle to the imperial throne, in 518, decided the fortune of Justinian, who, having been educated at Constantinople, had given proofs of considerable capacity and application. Justinus adopted Justinian as his colleague, and a few months before his death he crowned him in presence of the patriarch and senators, and made over the imperial authority to him in April, 527. Justinian was then in his forty-fifth year,

and he reigned above thirty-eight years, till November, 565, when he died. His reign suffered almost at its outset a terrible disaster in the bloodstained riot called the *Nika*, almost amounting to a civil war, occasioned by the frantic rivalry between the factions of the circus. For five days Constantinople ran with blood. Justinian prepared to flee; only the courage of Theodora restrained him. At one time a rival emperor was enthroned by the mob. With difficulty order was at last restored. By means of his great general, Belisarius, he held the Persians completely in check, defeated the Vandals and the Goths, and restored Italy and Africa to the empire. His base ingratitude to Belisarius is one of the stock tales of history. The eunuch Narses was permitted to filch the glory of the final reunion of Italy to the Byzantine crown, after Belisarius had practically accomplished the work. Justinian was the last emperor of Constantinople who, by his dominion over the whole of Italy, reunited in some measure the two principal portions of the ancient empire of the Caesars.

Justinian must be viewed chiefly as an administrator and legislator of his vast empire. In the first capacity he did some good and much harm. He was both profuse and penurious; personally inclined to justice, he often overlooked, through weakness, the injustice of subalterns; he established monopolies of certain branches of industry and commerce, and increased the taxes. A great deal of this financial weakness was due to his extensive buildings, of which St. Sophia remains a splendid example. Personally he seems to have been averse to cruelty, but his wife, the Empress Theodora, was probably one of the cruellest rulers who ever existed, and her influence over Justinian was unbounded. She had been famous as a prostitute and an actress, and afterwards abandoning her shameless life, she attracted Justinian's notice, and he obtained a special decree from the Emperor Justin reversing the laws of centuries in order to permit a legal marriage with an abandoned woman, a marriage which from the earliest Roman times had been held abhorred. Theodora had learnt in her shameful trade contempt of all men; her fortune was precarious, she therefore sought to assure her position and to amass a large fortune to provide against evils only too likely to befall her. She died, however, before Justinian (548). As empress her life was without reproach on the score of sexual immorality, and she carried her new virtue so far as to found a reformatory for fallen women. To cope with the expenses of his wife, of his constant church building, and of his wars, Justinian abolished the consulship, that ancient office now only serving as a dignity and involving great expenses for festivities. From religious bigotry he also suppressed the schools of philosophy at Athens. But he endeavoured to assist manufactures: for instance, at great trouble he introduced the rearing of silkworms into Europe; and the numerous edifices he raised, and the towns he repaired or fortified, attest his love for the arts and his anxiety for the security and welfare of his dominions. His love of theological controversy led him to interfere with the consciences of his subjects, and his penal enactments against Jews and heretics display a spirit of intolerance which has ever since been a dangerous authority for religious persecution. Procopius in his public history extols Justinian's wisdom, but in his private "Anecdota" covers his memory with mud. Allowing for exaggeration in both we can see that after all, narrow-minded, bigoted, and false as he was, Justinian is still entitled to admiration, if only because in one of the most difficult periods of the world's history he held his own for thirty-eight years, and left his government far stronger, and its laws and institutions far more consolidated, than when he found them. He was, or professed to be, a poet and philosopher, a lawyer and theologian, a musician and architect; but the brightest ornament of his reign is the compilation of a code of Roman law.

JUSTINIAN'S LEGISLATION. The history of the Justinian legislation naturally divides itself into two periods, during the first of which the emperor's efforts were mainly directed to the methodizing and arrangement of the existing body of law, while during the latter his labours were chiefly addressed to supplementing its defects by new constitutions of his own. To the first period (528-534) belong:—

1. *Codex Vetus* (the Old Code).—On 13th February, 528, shortly after ascending the throne, Justinian issued a commission to ten jurists, with Johannes the ex-quæstor of the palace at their head, and including Tribonian and Theophilus, to form a collection of the legislative enactments (*constitutiones*) of his predecessors from the time of Hadrian downward. This is nearly what we should call "statute law." Partial compilations of these had already been made. The codices of Gregorianus (306) and Hermogenianus (365) embraced the constitutions of all the heathen emperors for the 300 years from Augustus to Constantine the Great; while the *Codex Theodosianus*, compiled by eight jurists at the order of Theodosius II., in 438, contained those of the Christian emperors from Constantine to his own time. From these materials, as well as from the "Novellæ" of Theodosius, the code of Justinian was to be prepared. In about fourteen months (7th April, 529) this task was completed; and the new code, consisting of twelve books, and now entirely lost, received the force of law, and was made applicable to every subject of the empire.

2. *Pandectæ* or *Digesta* (the Pandects or Digest).—The following year (15th December, 530) Justinian commissioned Tribonian and sixteen others to digest the writings of the elder jurists into a regular and systematic exposition of Roman law, suited to the extended limits and the increased civilization of the empire. Full authority was given to the commission to abbreviate and to reject, and ten years were allotted for the accomplishment of the work. The commission having selected thirty-nine jurists of the greatest eminence, chiefly from the period which has been sometimes called the age of the Antonines, that is, from Hadrian to the death of Alexander Severus, proceeded to divide into three classes all the books (numbering about 2000 works) from which extracts were to be made, and to form themselves into three sections, one for each of the several classes of treatises. The first section read and extracted from the books on the *jus civile*, to which belonged the *Libri ad Sabinum*; the second section extracted from the books on the *Prætorian edict*, especially from *Ulpianus ad Edictum*; and the third section from practical and casuistical writings, especially from *Papinian Responsa* and *Pauli Questiones*. Three branches of extracts were thus formed—the Sabinus branch, the Edict branch, and the *Papinian* branch. From these the single titles of the Pandects were composed. The extracts from Ulpian form more than one-third of the whole work. In this way upwards of 3,000,000 lines are said to have been condensed into 150,000. It is clearly therefore rather a work of condensation than of codification which Justinian ordered. As a result the Digest, though the most wonderful law book in the world and the most far-reaching in its effect, is very ill-arranged, following the order in which the extracts happened to be read, the order of the old unwieldy *Prætorian edict*, &c., or, in fact, any order save a logical one.

The Digest was completed in less than three years. It was published on the 16th December, 533, and received the force of law on the 30th of the same month. All reference to the older jurists was in future forbidden; and all commentaries upon it were prohibited. Literal translations from the original Latin text into Greek were, however, permitted. The work is divided into fifty books, subdivided into titles and laws.

3. *Quinquaginta Decisiones*.—During the compilation of the Digest, Justinian published his "Fifty Decisions," being the resolution of certain moot points of law, the contradictory opinions of the schools of Sabinus and Proculus upon which had been a source of annoyance and perplexity to Tribonian and his colleagues.

4. *Institutiones* (Institutes).—While the Digest was being prepared, Justinian commissioned Tribonian and two other jurists—viz. Theophilus, professor of law at Constantinople, and Dorotheus at Berytus—to draw up an elementary work for the use of students, based upon the Institutes of Gaius and the *Codex Vetus* of Justinian. This work, which treats only of the *privatum jus*, was published 21st November, 533, and received the force of law on the same day as the Digest. It is in four books.

5. *Codex Repetitæ Prælectionis*.—The old code having been found to need revision, a new edition of it was published, and obtained legal force on the 17th November, 534. This is the code we at present possess, the former one being now entirely lost.

To the second period of the Justinian legislation (535-565) belong the 168 *Novellæ Constitutiones*, written for the most part in Greek, and the thirteen *Edicta Justiniani*. Down to the time of Basil the Macedonian, in 867, the different compilations of Justinian remained the sole source of law. That emperor, however, made a reconstruction of the whole *corpus juris*, under the title of *Basilica* (in Greek), which with various modifications continued in force till the fall of the Byzantine Empire in 1453, during the reign of Constantine XIV.

JUSTINUS, commonly called *Justin Martyr*, a celebrated Christian apologist, was born at Napolis in Palestine, a place formerly called Shechem, and which is now known as Nablus. His father was a heathen, and Justinus, who was well educated, devoted himself to a earnest search after truth, studying successively the Stoic, Peripatetic, Pythagorean, and Platonic systems of philosophy until an apparently chance interview with an aged stranger led him to embrace Christianity. He did not accept any office in the church, but for the rest of his life laboured zealously in the defence and promulgation of the new faith. Much of his time was passed at Rome, where he appeared still wearing the philosopher's cloak and declaring himself the teacher of a "new philosophy," though he also visited many other places, and at Ephesus conducted his famous discussion with the Jew Trypho. The dates of his birth and death are unknown, but the former may be placed about the beginning of the second century, and he suffered martyrdom at Rome somewhere between the years 118 and 165. He was the author of numerous works, most of which are unhappily lost, but there remain three which are of great interest and value, namely the two "Apologies for Christianity" and the "Dialogue with the Jew Trypho." Another work, entitled "A Speech to the Greeks," has come down bearing his name which many scholars accept as genuine, but the rest of the writings ascribed to him are generally rejected. Translations of the works of Justinus are included in the Oxford Library of the Fathers, and in Clarke's Ante-Nicene Library. See also Donaldson's "History of Christian Literature and Doctrine" (London, 1866, vol. ii.).

JUSTS or **JOUSTS**, martial exercises or private combats which took place during the mediæval periods between knights and other distinguished persons of chivalrous spirit. They differed in some respects from tournaments, which consisted of many men in troops, while jousts were contentions between man and man. In the middle ages these jousts became authorized by custom as trials of military prowess. The usual weapon was the lance, and the combatants rode against each other, a barrier breast-high being between them, but on some occasions they fought on foot with swords or battle-axes.

JUTE, the fibre of two plants of the genus *Corchorus* and order TILIACEÆ, namely, *Corchorus capsularis* and *Corchorus olitorius*. These plants are widely diffused in tropical countries, but are especially cultivated in India, yielding the jute of commerce and the fibre employed in



Jute (*Corchorus capsularis*).

making gunny-bags. The inner bark is separated, as in FLAX and HEMP, by maceration, in lengths from 6 to 12 feet, and constitutes the fibre of jute. It is only during recent years that this material has come into use in Europe,



Jew's Mallow (*Corchorus olitorius*).

and its progress has been extensive. It is chiefly used for making coarse bags, in which all the Indian produce of sugar, rice, pepper, ginger, saltpetre, guins, seeds, &c., is imported, and also the cotton of America and other places.

Jute is also woven into mats and coarse carpets, and similar articles of domestic use. It does not make good rope, on account of its liability to rot from moisture. The best jute in the world is grown in the district of Dacca, in Eastern Bengal. Many of the English houses in Calcutta have their agents stationed there, near such marts as Seraj-gung, Naraungunge, and Dacca. Merchants and speculators from Dundee also find their way into the jute districts, either to secure cheaper supplies for their mills or to arrange for the erection of mills on the Hoogly to work up the fibre. So rapid has been the growth of the trade in Great Britain that the quantity imported is now more than twenty times as large as in 1851, and more than 20,000 persons are engaged in its manufacture. The quantity of jute received in 1884 was 5,111,389 cwts.; value, £3,602,171. The value of the export of jute and its various manufactures in 1884 was £2,760,000. The chief seat of the jute trade in Great Britain is Dundee, to which town the manufacture was exclusively confined for some years. So important is the jute industry esteemed by the Indian government that a commission was appointed in 1874 to inquire into the cultivation and trade in jute and similar Indian fibres, with a view to their more extensive use in the manufacture of paper, &c. The result was an exhaustive report, containing excellent suggestions for improvements in the staple. Both species are used as pot-herbs in the East, but *Corchorus olitorius* is employed more commonly than the other, and is known by the name of Jew's Mallow.

JUTES, a people who in the fifth century appear to have been settled in the northern part of the Danish province of Jutland, which took its name from them. They took part in the English conquest of Britain, waged war with Charlemagne, and later, under the name of Normans (Northmen), frequently desolated the coasts of Germany and France.

JUTLAND, a large province of Denmark, formerly comprising the whole of the peninsula which projects northwards from Prussia and Germany, but since 1864 restricted to that part of it belonging to Denmark north of Schleswig, extending from 55° 23' to 57° 44' N. lat., and from 8° 7' to 10° 48' E. lon. It is bounded E. by the Little Belt and the Kattegat, N. by the Skager Rack, and W. by the German Ocean. The southern part of the peninsula, extending from the frontier of Holstein to an irregular line from Kolding Bay to a point on the west coast opposite the extremity of the isle of Fanø, constitutes the Prussian province of Schleswig.

Jutland is about 180 miles long, with a breadth varying from 70 to 100 miles. The area is 9597 square miles, and the population in 1880 was 864,492. Few countries have such an extensive line of coast (523 miles) in proportion to their area as Jutland, which is indented with numerous bays and inlets. Of these inlets, the Lümfiord extends across the north of the province, first in a western, and then in a south-western direction for about 100 miles. It contains numerous islands; the largest, called Mors, is 23 miles long and 11 broad, and has 6000 inhabitants. In 1825 the North Sea broke through the narrow strip of land between it and the Lümfiord, and the breach being gradually enlarged, the northern part of Jutland is now an island. The apparent advantage of this extensive line of coast is much diminished by the shallowness of the sea and the innumerable little islands, sandbanks, and shoals, which render access difficult. The west coast is bordered by a chain of sandhills, within which there are many good pastures. The southern part of the west coast is alluvial soil, extremely fertile, but swampy and unhealthy, and requiring dykes to protect it from the inroads of the Ger-

man Ocean. The east coast is more elevated, and is well wooded, fertile, in grain, and populous. The peninsula terminates northwards in the promontory of Skagen, from which a line of low hills runs through the whole length of Jutland. The rivers are very small; lakes are numerous. The principal river is the Guden, which is navigable for 50 miles, and is joined by the Silkeborg Canal. Others of less importance are the Stor, Skjern, Warde, and Lønborg. The highest point of the watershed is the Himmelsberg, 550 feet above the sea-level. The productions are corn, hemp, flax, tobacco, and some timber. The horses are large. The breed of black cattle is good, and numbers of them and of hogs are exported to Holstein. Fish and game are abundant. The manufactures comprise linens, yarns, and hosiery for domestic use. The climate is very variable, with frequent fogs and rains; the winters are not very rigorous, but the summer is often extremely hot. The north-west wind, called *skai*, which is especially felt in May and June, is so severe on the west coast as to wither the tops of the trees. The inhabitants are principally engaged in agriculture and seafaring pursuits. Jutland has belonged to Denmark since about 850. It is one of the few peninsulas of Europe that project northwards.

JUVENAL (*Decimus Junius Juvenalis*), the prince of satirists, and the most favourite of all the Latin authors save Horace, Virgil, and Ovid, was born probably at Aquinum, a Volscian town, somewhere about 40 A.D. He is said to have died aged upwards of eighty, under Hadrian. In fact, nothing certain is known about him. He was the *JUNUS* of the Romans, burning with scorn and bitterness, but personally hardly known. The relative merits of Juvenal and Horace as satirists have been warmly contested. It is a question on which men will form opposite opinions, as their tempers are more fit to relish brilliancy and playfulness or earnest and dignified declamation. Juvenal is said to have spent much time in attendance on the schools of the rhetoricians; and the effect of this, in an age not remarkable for purity of taste, may be observed in a tendency to hyperbolical inflation, both of thought and style. His writings are addressed to the encouragement of virtue no less than to the chastisement of vice, though they lie open to the objection of descending over-minutely into vicious details. But the pointed way in which, with a line or a touch, he makes that foul past live before us excites our admiration and our thankfulness. He was the last of the great Romans. Writing at the same time as Tacitus, and writing of the same circumstances, he lends the glow of a denunciation almost religious in tone and the heightening force of a splendid poetry to the dry compressed facts of the great historian. It is Juvenal, and not Horace,

that Swift and Johnson loved to imitate, and though Johnson could not equal either the fierceness or the plain speaking of the Latin, he has succeeded both in his "London" and his "Vanity of Human Wishes" in conveying to English readers some glimmering of a modern version of the third and tenth satires of the immortal sixteen. Finally, what endears Juvenal to the scholar is the fact that he is of all the great authors the most truly Roman. Not the Greek-loving, Greek-imitating polish of the Augustan school, but the stern, fierce, intolerant Roman republican spirit, was his. His lines are elaborate, it is true, but it is the elaboration due to the years over which their composition is known to have spread, the poet touching and re-touching his work to render it yet more pungent than before, till it has become, if possible, over-full of point and meaning. Juvenal has in consequence added largely to the wealth of quotable lines, but he would have been a greater if he had been a simpler writer.

JUVENILE OFFENDERS. In British law a child under the age of seven is presumed to be incapable of committing a crime, and between this age and that of fourteen years his capacity has to be affirmatively proved. When this can be done children are punishable like other persons, but to avoid the evils of long imprisonment, and the probability of further corruption when such offenders are brought into association with hardened criminals, special enactments have been made. Whenever a person under the age of sixteen is brought before justices and convicted of larceny, or of aiding in its commission, he or she may be summarily convicted and sentenced to imprisonment for a period not exceeding three calendar months, with or without hard labour, or to forfeit a sum not exceeding £3. If a male under fourteen years the offender may be once whipped with a birch rod, receiving not more than twelve strokes, in addition to the other punishment or instead of it. If the accused or his parents object to a summary conviction the case must be submitted to a jury in the ordinary way. In all cases where a sentence of more than fourteen days is passed, the magistrate may direct that after it has been served the offender shall be sent to a reformatory school, for a period of not less than two or more than five years. When a child is placed in a reformatory school, the parent or step-parent is required to contribute towards his or her maintenance if able, the sum being limited to 5s. a week. The law respecting juvenile offenders is regulated by the Act 10 and 11 Viet. c. 82, extended by the Acts 13 and 14 Viet. c. 37, and by 25 Viet. c. 18. The corresponding Scotch Acts are 14 & 15 Viet. c. 27; 25 Viet. c. 18; 29 & 30 Viet. c. 117 and 118; 34 & 35 Viet. c. 112; 40 & 41 Viet. c. 53.

K

K has the same sound which C has before the vowels *a*, *o*, *u*. Neither in its essential sound nor in its form has K much varied from the earliest Phœnician times. It is the sord of which *g* is the sonant and the Scotch *ch* (as in *loch*) the guttural. K is properly a Greek letter. In Latin the symbol *c* was used for *k*, and therefore modern tongues which have come through the Latin contain *c* largely, while the others contain the original *k*. Comparing German with French the difference is at once apparent, even words which German has adopted from Latin direct being made to conform to the *k*-spelling, as *Kammer*, *Onkel* (from *camera*, *arunculus*), which in French are *chambre*, *oncle*. (For some changes between *c*, *g*, and *k*, see the article on the letter G.) In our older speech, up to and a little beyond the Norman Conquest, the letter *c* was

truly a *k*: the softer *ch* sound, making *cese* (*chee*) to *cheese* and *cild* (*kild*) to *child*, was due to Norman-French influence. But even before this the hard Anglian *k*-sound of the north had been replaced in many words by a softer *h*-like sound, or guttural *ch*: thus the Anglian *bræt* became in Wessex *briht*, and Cudbret of Northumbria was called Cudbriht in the south. When the *c* still further degenerated into a mere *s*-sound before certain vowels, the letter *k*, hitherto not used, was brought into play to preserve the ancient use of *c* and distinguish those words which still retained the hard sound from those which had become corrupt.

Although this letter is now superfluous, it was not so when the characters of an alphabet were syllabic in power. Thus the letter *k* appears to have denoted at one time the syllable *ka*, while another character represented *ko*, and so

on. Hence in the Greek and Hebrew alphabets the former was called *kappa*, *kaph*; the latter *koppa*, *koph*. This accounts for the fact that in Latin the letter *k* was never used except before the vowel *a*, precisely as *q* is found only before *u*, and the Greek *koppa* only before *o*. Even our own alphabet seems to imply such a limit in the use of this consonant, when it pronounces its name *ka*, not *ke*, though the latter name would better agree with *be*, *ce*, *de*, &c. *K* is now (but used not to be) silent before *n*, as in know, knife, knee. As a contraction, *K* stands for knight, as K.G., Knight of the Garter; K.C.B., Knight Commander of the Bath; K.T., Knight of the Thistle; K.P., Knight of St. Patrick, &c.

KA'ABAH or **KAABA**. See CAABA.

KAB'ALAH or **CABBALA** is a term which is sometimes used in a general sense to include the whole esoteric doctrine of the Jewish rabbins, but which is more properly used to designate a system of Jewish theosophy which arose in the tenth century. The meaning of the term Kabbalah may be given as "doctrines received by tradition," and under this designation the earliest of the rabbins included all the books of the Old Testament, except the five books of Moses, as well as the mass of oral tradition which ultimately became embodied in the Talmud. It is impossible to say when the notion of there being a concealed meaning under the words of the Torah first arose, but it certainly flourished before the Christian era, and the rules employed by the rabbins for the discovery of this esoteric doctrine are referred to by several of the Christian fathers. These rules, which were numerous and elaborate, included among other methods that of a re-arrangement of Scripture words into squares, and a reading of the letters vertically so as to form new words. In other cases the letters of the different words were transposed, each letter was taken as representing a complete word, or the letters of a word were reduced to their numerical value, and the word was interpreted by another whose letters represented a similar amount. As may be imagined such methods of interpretation soon blossomed out into a number of mystic doctrines, and enabled rabbins of a speculative turn of mind to absorb Gnostic or even Christian theories, and find support for them in the words of the sacred law. These doctrines were collected and expounded in a remarkable book called the "*Zohar*," which appeared in the thirteenth century. This was written in Aramaic, and in the form of a commentary on the Pentateuch it professed to give certain secret doctrines which had first been made known to Adam in paradise, and which had been handed down by tradition through Noah, Abraham, Moses, Joshua, and the seventy elders of Israel to the later Jewish rabbins. The compilation of the work was ascribed to a certain Rabbi Simon ben Yochi, said to have flourished about the beginning of the second century A.D.; but internal evidence points to the close of the thirteenth century as the date of its composition, and the real author is believed to be one Moses de Leon, who first circulated and sold the book. The doctrine of the Kabbalah included a recognition of the infinitude of God and the impossibility of defining his nature. It asserted the creation of the universe to certain emanations of the Deity, whose modes of existence and working were elaborately expounded. It also included a belief in angelic beings, one of whom presided over the world; in the pre-existence of the human spirit; regarded this life as a period of probation; included in its eschatology a belief in heavens and hells; but, unlike orthodox Christianity, it anticipated a final victory of good over evil which should include all men and all angelic beings in a universal restoration. The influence of Christian thought upon the Jewish mind is also unmistakably present, and the doctrines of the Trinity and the incarnation of a suffering and atoning Messiah are included, though somewhat vaguely, in its scheme. The

latter element was indeed so strongly marked that many eminent Jewish teachers were led by their studies of kabbalistic lore to accept Christianity for themselves, and to seek ardently to make converts of their brethren. The doctrines of the Kabbalah soon attracted the favourable attention of Christian scholars also. Pope Sixtus was so persuaded of their value that he ordered some of the kabbalistic works to be translated into Latin for the benefit of ecclesiastical scholars. The Kabbalah was also strongly advocated by Mirandola and John Reuchlin, and through the works of the latter both Roman Catholic and Protestant scholars were led to study its system of theosophy. The doctrines and speculations of the Kabbalah still exercise an influence over some of the continental Jews, but so far as Christian thinkers are concerned they possess an historical interest only. (See "*The Kabbalah, its Doctrines, Development, and Literature*," by Dr. Ginsburg, London, 1865.)

KABUL. See CABUL.

KABUL' or **CABUL**, a river in Afghanistan, which rises in the Oonna Mountains, about lat. 34° 20' N., and falls into the Indus, near Attock, after a course of about 310 miles. It is the only great affluent which the Indus receives from the west, and flows with extraordinary rapidity.

KABYLES. See ALGERIA.

KAD MOS. See CADMUS.

KAEMPFER, **ENGELBRECHT**, an eminent traveller, was born 16th September, 1651, at Lemgo, in Westphalia. He passed through several schools, and finally studied medicine and natural science at the University of Cracow for three years, and at Königsberg for four years more. From Prussia he went to Sweden, where he solicited and obtained the place of secretary to an embassy which was then going to Persia. In 1684 the embassy arrived at Ispahan, then the capital of Persia. The information which Kaempfer collected during his travels and his residence in Persia is embodied in his "*Amenitates Exoticæ*." When the embassy returned to Europe in 1685, Kaempfer entered as surgeon into the service of the Dutch East India Company, served in the Persian Gulf, and, sailing from Bender Abbassi, in 1689, for Batavia, visited most of the countries on the western shores of Hindustan. At Batavia he occupied himself chiefly with the natural history of the island of Java. In 1690 he went from Batavia to Japan, as physician to the embassy which the Dutch East India Company annually sent to the Japanese court. He remained at Nagasaki, in Japan, from September, 1690, to November, 1692, and during this time he accompanied two embassies to Yeddo. His observations on Siam and Japan are given in his work entitled "*The History of Japan*," the original of which has never been published; but a translation was made from a copy in the possession of Sir Hans Sloane by J. G. Scheuchzer, and published in England in two vols. folio (1727). This book for over a century was almost the only available source of information with respect to Japan open to European scholars, and notwithstanding the great changes that have taken place in the intercourse with that country, it is still of value. Kaempfer returned from Japan to Batavia, which he left in 1693 for Amsterdam. In April, 1694, he took the degree of doctor of physic at the University of Leyden. On his return to his native place, he was appointed physician to his sovereign. He died 2nd November, 1716.

KAFFRA'RIA, **CAFFRA'RIA**, or **KAF'IRLAND**

is the name formerly given to the part of Africa occupied by one of the branches of the negro race, who were called Kafir, the common name among the followers of Mohammed for those who reject his religion, by the early Portuguese, Dutch, and English colonists of the east coast. Their country may be roughly stated to have extended over the territories now officially known as the districts of King,

William's Town and East London, in Cape Colony, the Transkei, Natal, Zululand, Transvaal, and the Orange River Free State.

The Kafirs, who are a fine race of men, mentally and morally superior to the ordinary negro, and extremely keen-witted, are conjectured to be connected with the more northern African tribes, and to have gradually displaced the aboriginal Hottentots and Bosjesmans. They are of a bronze colour, which is of a darker hue the further south they are situated, and the hair is of the woolly character. In common with so many African peoples they practise polygamy and circumcision, and have few definite religious ideas; but they are extremely superstitious, and believe firmly in witchcraft. Though in modern times many tribes are more settled than in the past, they are generally a semi-nomadic and pastoral people, and their villages or kraals of conical huts are constantly moved to suit the changes in the state of the grazing lands. Some of their tribes, however, understand and practise copper and iron working, and the art of cultivating cereals is increasing among them. The language, but for the clicks, which have been accepted from the Hottentots and Bosjesmans, is agreeable, but it is extremely intricate in its use, owing to the numerous verbal inflexions and to the inflected prefixes of nouns and words in agreement with them. That the Kafirs are not wanting in bravery the English found to their cost in the Zulu and Kafir wars.

KAFFRARIA, BRITISH. What was formerly British Kaffraria was incorporated with Cape Colony in 1865, and is now divided into the districts of King Williams' Town and East London. The name British Kaffraria is now no longer used. These districts form a fine tract of country, one of the best in South Africa, well supplied with rain, and with much good agricultural land, as well as rich pastures. The area is estimated at 3000 square miles and the population at 120,000. Large tracts of rich land have been set apart for them under the name of reserves or locations, which they cultivate with success. Seaward the country is broken, with many fine valleys; northwards it rises in high bare plateaus. Cereals of all kinds are largely cultivated, and there are numerous forests abounding in valuable timber.

KAFFRARIA PROPER, now known as the Transkei, embracing Fingoland, Idutwaya Reserve, Gealekaland, Bomvarieland, Tambookieland, Griqualand East, and Pondoland, has an area estimated at 1800 square miles and a population of about 200,000, and lies between the Great Kei River on the west and the Umziinkulu, which divides it from the colony of Natal on the east. It has No-man's-land on the north, the sea on the south, and the districts of Williamstown and Queenstown, Cape Colony, on the west. The country is well watered by the rivers Umzimvubu or St. John, and its tributaries the Tsitsi, Tena, and Umziinkulu, by the Bashee, Untata, Umgazi, Umzimblava, Untenta, the Untamvuna, and by many smaller streams, which traverse its rich and fertile vales. The climate is salubrious, and the country more regularly supplied with rain than most parts of Cape Colony. Much of the district is now under British authority.

KA FIRISTAN (meaning "the land of the infidels"), is a country of Asia of which little is known, though that little is most interesting. The Hindu-Kush Mountains form the northern boundary, and send offsets into the country, which is elevated throughout. Kashgar bounds it on the east. The south and west boundaries are uncertain. At continual enmity with the Mohammedan nations around, the inhabitants appear inclined to be friendly to the English, but their worship is purely heathen, and they practise polygamy. In addition to the name Kafirs or infidels given to them, they are also called *Siah-pesh* or black-clad, from the dark tunics they wear, made from goat's skin or hair. The first distinct record of them in

history is the memorable expedition conducted by Timur, who crossed the snowy crest of the Hindu-Kush in pursuit of the idolators of Kator, a name applied anciently to Kafiristan, and still surviving in the name of the reigning family of Chitral, who, Major Biddulph tells us, are called Katoore. The Kafirs fled from the Tartar conqueror into their most inaccessible fastnesses, but they were pursued by Timur, who with characteristic audacity caused himself, with his charger, to be lowered by ropes down the precipitous face of the mountain, and compelled the infidels to sue for mercy. Another detachment of Timur's army, however, met with less success, and there appears good reason to believe that the emperor was glad on the whole to abandon a profitless and dangerous campaign. Since then the Kafirs have enjoyed a singular immunity from interference. Though any stranger entering their country without warning is pretty certain to be attacked, they receive visitors freely who are passed into the country by one of themselves.

KAINOZOIC. See CAINOZOIC.

KAIR'INE. This substance has been recently introduced into medicine as a febrifuge to replace quinine. It is the hydrochloride of hydroxymethylhydrquinoline ($C_{10}H_{13}NO.HCl$). It is obtained in minute white crystals, soluble in water, less soluble in alcohol, and insoluble in ether. It has a saline, bitter, and extremely nauseous taste, and is used with good effect in fevers and acute inflammations in doses of from 5 to 15 grains. It has the effect of colouring the urine green.

KAIRWAN, the most sacred city of North Africa, is situated about 120 miles south of Tunis, and dates from 670 A.D., when it was founded by the Arab warrior Sidi Okhba, who made it the headquarters of his military excursions. Kairwan speedily became the strongest city in North Africa, and though from a military point of view it has long fallen into decadence, it is still the hotbed of Mohammedan fanaticism, as it abounds in shrines and mosques, which have been erected by the various rulers. The population is about 15,000, and the chief trade is in leather and carpets. In the centre of the city is the tomb of Sidi el Awib, the companion and bosom friend of Mohammed, with three hairs of the Prophet's beard placed upon his heart. The most important of the 149 mosques is that dedicated to Sidi Okhba, the founder of the city, and where the boys of Tunis are generally buried, there being a legend that Mohammed shows special favour to the souls of those believers who are interred there, and takes them straight into paradise. There is an ancient Arab prophecy also that when the end draweth nigh, Kairwan will become the custodian of the holy treasures of Mecca. Kairwan and the Okhba Mosque in particular are the objects of pilgrimage annually of thousands from all the African countries, and until its occupation by the French in 1881 few Christians had ever penetrated within its walls, while no Jew had ever been allowed to enter, all business dealings with the obnoxious but indispensable Israelite being transacted in a house situated about a mile outside the town. The Okhba Mosque is so constructed as to be in a direct line with the city of Mecca, and it runs therefore east and west. The prayer chamber faces the east, while the minar or tower is built at its western extremity.

It was from Kairwan that Spain was conquered, and that Andalusia derived the builders and artists who raised the mosque of Cordova and founded the rich Mohammedan art of the peninsula. During the first centuries of Mussulman rule in Spain, Kairwan, in spite of the struggles between Arab and Berber, and between the Eastern and Western caliphates which surged around it, was a rich and prosperous city, at once the centre of African commerce and an object of pious pilgrimage to the neighbouring Mohammedan nations. Under the Aglabite dynasty of the

ninth century it rose to its highest pitch of splendour and power. The Aghlabite kings were the conquerors of Sicily, Sardinia, Corsica, and Crete, and north and south met in striking fashion when the envoys of Charles the Great came to the court of the first Aghlabite sovereign to ask for the bones of St. Cyprian. It was under this dynasty that tradition reports Kairwan to have consisted of thirty quarters, each one as large as the present city, and outside the wall; of the existing town traces are still visible of the magnificent suburb where successive kings built their palaces, and of the great reservoirs and other public works on which they spent their subjects' money. The Aghlabites were succeeded in the tenth century by a dynasty of Berber origin, the Fatimite or Green caliphs, these again by the Zeirites, under whom the decay of Kairwan began. The loss of the Aghlabite conquests in Sicily and Southern Italy at the hands of the Normans was followed by the destruction wrought in Northern Africa by what one may call the second Arab conquest of the twelfth century. A fierce wave of Arab tribes swept over Northern Africa and into Spain in that century, leaving only ravaged country and ruined cities behind it. The Arabic geographer Edrisi, writing about 1150 in the court of the Norman Roger, already speaks of Kairwan as a city which had once been great, but whose glory had long since departed, and from his day up to the transient conquest of Tunis by Charles V., and the final subjugation of the regencies of Tripoli, Tunis, and Algeria by the Turks, nothing interfered to prevent the steady march of ruin and decay. Under the Turks the military force of the country was once more organized and made effective, and the raids of the Barbary pirates on Christian commerce made the name of Tunis a terror to Europe, and paid many an old grudge which Islam owed to Christianity. It was to Kairwan that multitudes of the exiled Mocticos fled from the fanatical and ignorant Spain which drove them out, and there many of their descendants are still keeping, according to Kairwan tradition, the keys of the houses from which they were driven out in preparation for that return which they believe the Prophet will one day grant them.

Kairwan in its prosperous days was not, however, only a centre of Mohammedan mystical tradition, it was among the greatest schools of Mohammedan learning. Of the numerous *Zaonia* or law schools which it contained, one or two exist at the present day, and one of them is still reported to possess a precious library. But the majority of the MSS. in which Kairwan was once rich have long since disappeared from their old home, and are to be sought and found in the libraries of Europe.

KAISER, which we translate *Emperor*, should really be translated *Cæsar*. The later Roman emperors, from Diocletian onward, besides dividing the imperial sway, on account of its vast extent being beyond one man's grasp, usually named one or more *Cæsars* or deputy-emperors, and a *caesare* was held equivalent to a promise of future empire. The Dauphin of old France, the Prince of Asturias in Spain, the King of the Romans in mediæval Germany, and the Prince of Wales in England are analogues of the Roman *Cæsar*. The line of the Danube, Croatia, and Dalmatia, was usually confided as a "march" or frontier to the special care of a Roman *Cæsar*, and the Dukes of Austria, holding this territory in later times, adopted the title *Cæsar* or *Kaiser*, which on their elevation to the Empire of Germany (the old Holy Roman Empire) they used as the German equivalent for the Latin *imperator*. The present Kaiser (Emperor) of Germany, the King of Prussia, of course took the title on this view, that it is a German translation of *emperor*. The Russian *Czar* or *Tsar* is another corruption of the Latin *Cæsar*.

KAK'APO (*Strigops habroptilus*) is a remarkable bird belonging to the order *Psittaci* or *Parrots*, and forming a distinct family, *Strigopidae*. It is confined to New Zealand,

and is called the owl parrot by the English colonists, from the resemblance which it presents to an owl in aspect and in the nature of its plumage. In its habits the kakapo is almost wholly nocturnal, passing the day concealed in fissures of rocks or holes under the roots of trees, and coming forth after sunset to seek its food, which consists of roots, berries, and other vegetable substances, especially mosses. It has been met with occasionally in the daytime occupied in feeding. The wings are short, convex, and rounded; they are perfectly useless for flight, but are used occasionally to break the force of the fall in descending from a tree to the ground, though often the bird is observed to drop like a stone. In running on the ground the wings are kept open slightly, for the purpose apparently of preserving its balance. This bird's terrestrial and nocturnal habits in a country which has no indigenous carnivorous mammals renders flight unnecessary for its well-being. On the ground, however, it runs with great facility, and forms tracks in the places which it frequents of about a foot broad, and so exactly like ordinary foot-paths, that when first seen they led to the suspicion that natives were residing in the vicinity. The cry of this bird is a hoarse croak, and is compared by the natives to that of a species of owl inhabiting the same country. The holes which these birds inhabit are generally natural cavities, but are sometimes excavated by the tenant. The kakapo is not very abundant, and since the introduction of cats into New Zealand its numbers have decreased so greatly that there is some reason to fear that it will speedily become almost extinct.

The kakapo is about 26 inches in length. It is covered with a thick soft plumage, resembling in its texture that of the owls and other nocturnal birds; and like these it has a perfectly noiseless flight. The general colour of the plumage is a grayish-green, darker on the upper surface, where it is mottled with spots and zigzag lines of black; the lower surface is black, marked with delicate, undulated, dusky lines. There seems to be considerable variation in colour, the belly and under tail-coverts being sometimes bright yellow. The eyes are of considerable size and surrounded below by a facial disc of slender feathers, which partially conceal the base of the bill, exactly as in the owls. The bill is large and powerful. The keel of the breast-bone is much reduced, probably through disuse in connection with the loss of the powers of flight, as in the analogous case of the great extinct pigeon, the dodo.

KAL'CHAS. See **CALCHAS**.

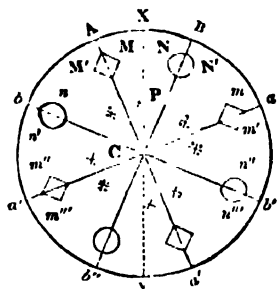
KALE, the name given (1) to a species of cabbage, the *Brassica oleracea* of botanists. This is the vegetable known to the kitchen gardener as greens. It does not run to a heart, like the common cabbage, but is marked by the open head of its dark green or purplish-coloured leaves. The variety termed German greens is much used as a winter vegetable. From the close clustering form of the edges of its leaves it is sometimes named curly greens. (2) Kale, with a prefix, as Sea-kale (*Crambe maritima*), is another plant much used for the table. It is a native of the south of Europe, but is now extensively cultivated in Britain.

KALEIDOPHONE, an instrument for observing the vibration of rods fixed at one end (held in a vice or screwed into a plate, &c.), and then plucked aside or bowed with a violin bow. It was invented by Wheatstone, and consists merely in mounting upon the rod a shining glass bead, which is strongly illuminated so that the vibration of the rod traces a brilliant figure in the air, like a boy when he whirls round a glowing firebrand. The figure, for example, made when the rod is simply plucked is not, as might be expected, a line formed by the to-and-fro vibration, though it begins in a line; for it speedily opens to an ellipse, then to a circle, then it narrows to an ellipse, and so back to the line. Thus it is seen that the vibration is transverse as

well as direct. Bowing a rod with a violin bow gives a variety of beautiful loops and knots, some of great intricacy. By fastening an elastic rod to another at right angles, the vibration of a point in three dimensions can be examined.

KALEIDOSCOPE, a name compounded of three Greek words (*kalos*, *eidos*, and *skopeō*), and denoting the exhibition of beautiful forms, is the designation of an optical instrument which was invented by Sir David Brewster, and made public in 1817. The essential parts of the instrument consist of two plane mirrors of glass, having their posterior surfaces blackened in order to prevent any reflection of light from thence. Each mirror is from 6 to 10 inches long, and of a trapezoidal form—the larger end about $1\frac{1}{2}$ inch wide, and the shorter end about three-fourths of an inch; and the two are placed in contact with one another at the wide end of each, so as to form a dihedral angle, the like ends being placed together. The object to be viewed is disposed contiguously to the larger ends, and the eye should be near the opposite extremity, but a little above the line of contact. The effects produced by the reflections of the light may be understood from the following explanations:—

Let $A C$, $B C$, be the two extremities of the mirrors on the side furthest from the eye of the observer. These lines, and the sectoral space between them, will be visible by rays coming directly to the eye; and at the same time rays from the line $A C$, falling at a certain angle of incidence on the mirror which passes through $B C$, will, on being reflected from thence to the eye, give rise to the image $C A$ of that line; in like manner rays from the line $B C$ falling at an equal angle of incidence on the mirror



passing through $A C$ will, after reflection, give rise to the image $C B$ of the line. These, with the intermediate rays, produce the first reflected sectors $B C A$ and $A C B$. Other rays from the sector $A C B$ at the surface of the mirror $A C$ will fall on the mirror $B C$; and while a portion of them arrive at such angles of incidence as to be reflected to the eye and produce the perception of the sector $a' c b'$, another portion of them will be reflected back to the mirror $A C$ at such angles of incidence as to be re-reflected to the eye and cause the perception of the sector $a' c b'$. In a similar manner the rays first reflected from $B C A$ will, by subsequent reflections, give rise to the perceptions of the sectors $b' c a'$, $b' c a'$.

Thus it is easy to perceive that an object, as M , on $A C$, with its immediately reflected image M' , will give rise to the appearances of similar figures at m' , m'' , m''' ; and an object, as N , on $A B$, with its immediately reflected image N' , will give rise to the appearances of similar figures at n , n' , n'' , n''' ; also an object, as P , between $A C$ and $B C$, will appear by reflection similarly situated in all the other sectors.

Sir David Brewster found means to obtain multiplied images of such objects as flowers, trees, and even persons or things in motion, and thus the importance of the instrument was greatly increased. Some kaleidoscopes have been executed in such a manner that the two mirrors

may be placed at any required angle with one another, by which means the images in the visible field of view may be varied at pleasure. The instrument is capable also of being constructed so that the multiplied image may be projected on a screen, and thus made visible at one time to many spectators. Again, Dr. Roget has shown ("Annals of Philosophy") that the properties of the instrument may be greatly extended by employing, instead of two, three and even four plane mirrors, united together at their edges so as to form a hollow prism, or a frustum of a pyramid, the reflecting surfaces being towards the interior. These are called polycentral kaleidoscopes.

KALENDAR. See CALENDAR.

KALENDS. See CALENDS.

KALEVA'LA is the title of the national mythological epic of Finland. It was prominently brought into notice by Mr. Long in his "Custom and Myth" (London, 1884), and was translated in full by Messrs. Clodd and Kirby in 1885. There is much that is elevated and fine in the Kalevala, but its chief interest lies in its being probably a relic of races which existed before the Aryan conquest of Europe.

KALGUEV' or **KOLGUEV** is a considerable island in the Arctic Ocean, in the Russian government of Archangel, and situated to the north of the peninsula of Schemonkonski. It is about 66 miles in diameter. The surface is undulating; it has some low mountains, which rise in the centre, two small rivers, and several brooks of fresh water. The cliffs are covered with an incredible number of sea-birds; the interior abounds with polar bears, foxes, &c. Except a few Samoyeds there are no settled inhabitants. It is resorted to every summer by traders from the mainland, who procure here large quantities of skins, eggs, and feathers.

KALIDA'SA, the greatest dramatist of India, and the greatest poet of the second period of Sanskrit literature, is said to have lived at the court of a king Vikramaditya at Ujjayini (Ujjain), where he formed one of the "minstrels" or illustrious men. Scarcely anything is known of his personal history, and the period in which he flourished is very uncertain. Native tradition places it during the first century of our era. Weber and Lassen fix the third century as the most likely period, while Dr. Bhāṣa Dīk assigns him to the middle of the sixth century of the present era. Kālidāsa was the author of three dramas, the "Sakuntala," the "Vikramorvasi," and the "Mālavikāgnimitra." Of the first of these, which is also the finest of the three, there are two recensions of the text in Urdu, the Bengali and the Devnagari, the latter being regarded as the oldest and best. This was introduced to European scholars by Sir William Jones, who published an English translation in 1789. It gained the highest praise from Goethe, and the interest it awakened in England and Germany gave an immense impulse to the study of Sanskrit in both countries. Several editions of the original text have since been published in Europe, and it has also been several times translated into English, French, and German. Among the later translations that of Professor Monier Williams (Oxford, 1853; verse translation, 1856) is perhaps the best known. The "Vikramorvasi" has also been translated into English by Professor Monier Williams and by Professor H. H. Wilson. In addition to the dramas mentioned, two epic poems, several lyrics, and a poem on the six seasons, are ascribed to Kālidāsa, as well as a poem entitled "Nalodaya," but many scholars assume the existence of more than one poet of this name. See also "Indian Wisdom" by Professor Monier Williams (London, 1876).

KALIHARA, the name given to a vast extent of dry and sterile country in South Africa, extending north from the Orange River, in lat. 29° S., to near Lake Ngami in lat. 21° , with an average width of 6° of longitude, or an area

of nearly 200,000 square miles. It is a region of red sand, resting on a bed of tufaceous lime, or Dunn's glacial conglomerate, and covered with a dense low bush. It has no running streams, although the few Bushmen who inhabit it discover water here and there in the dry beds of streams, forming what are known as sucking places. Owing to this want of water the Kalihara is seldom traversed, even by the natives.

KALKBRENNER, FRIEDRICH W. M. (1788-1819), was a musical composer and teacher of some considerable ability, and as a pianist an executant of almost unrivalled smoothness. Chopin was nominally placed under him in 1831; which, though an absurdity in itself, shows his reputation. From 1814 to 1823 Kalkbrenner lived in London, but in 1824 he went to Paris, where he always afterwards remained, and here he connected himself with Pleyel's Pianoforte Manufactory, following the example of Clementi and Cramer at London. He even became wealthy in this combination of the tradesman and the artist. His music is but little played now, as though correct and excellently written for the instrument it wants imagination. As this quality is not required in studies for practice, his collection of studies reached to great favour, and is still very largely used.

KALIOPE (or *Callyope*), the muse of epic poetry, represented with a tablet and stylus, or with a reel of parchment. See MUSES.

KALLIS TO. See CALLISTO.

KALMIA, a genus of plants belonging to the order ERICACEÆ. *Kalmia latifolia* (the calico bush or mountain laurel) is a native of North America from Canada to North Carolina, on the sides of stony hills. The leaves and flowers of this genus are poisonous, and the honey of bees which collect the juice is injurious. *Kalmia angustifolia* is a native of North America from Canada to the Carolinas, in bogs and swamps, and sometimes in dry mountain lands. It is a shrub 1 or 2 feet in height, with dark red flowers. It is called sheep laurel in North America, because it is supposed to be very injurious to sheep; and the partridge is said to become poisonous as food after feeding on it. The corolla has the form of a wide-mouthed bell with ten hollows in the interior, which partially conceal the anthers; the capsule is five-celled.

KAL'MUCKS, a Mongolian race of nomads calling themselves Derben-Monat, meaning "the four relatives," and inhabiting parts of South Siberia, Mongolia, Dzungaria, the extreme south-east of European Russia, Turkestan, &c. Some of them are under the Russian, others under the Chinese government, and some acknowledge no master. They are of middle size, strong and well proportioned, with large heads and round faces; the colour generally olive brown, the hair black, and eyes slanting downwards towards the nose, which is not well formed, but many of the women are fair and very good-looking. Some have embraced the religion of the Russians, and have settled plantations on the eastern borders of the country; a few are Mohammedans; many are still pagans, but the majority profess Lamaism, and lead a nomadic life. Their wealth consists in cattle, horses, sheep, and camels, which they exchange for corn and other necessaries, domestic utensils, and metals, and other raw material used by their artificers, who are skilled smiths, armourers, and cutlers. They are under chiefs or princes. The head of the whole race is said to be a direct descendant of Genghis Khan, under whom, and some of his successors, this people made a great figure in history. The scattered encampments of a horde can speedily communicate and act simultaneously. An instance is recorded in which a horde numbering 500,000 moved off, by previous concert, on a single day, in order to avoid a tax imposed by the Russians; and, settling in Northern Mongolia, placed themselves under the protection of the Emperor of China.

KALONG (*Pteropus edulis*), the largest of all bats, belongs to the family Pteropidae or FRUIT-BATS. The kalong is about 14 inches long, and sometimes attains a greater size; the expanse of the wings from tip to tip is nearly 5 feet. It is exceedingly numerous in Sumatra and Java, and is found also in the other islands of the Malay Archipelago. The habits of these large fruit-bats have been well described by Horsfield:—"Numerous individuals select a large tree for their resort, and suspending themselves with the claws of their posterior extremities to the naked branches, often in companies of several hundreds, afford to a stranger a very singular spectacle. A species of fig, in habit resembling the *Ficus religiosa* of India, which is often found near the villages, affords them a very favourite retreat, and the extended branches of one of these are sometimes covered by them. They pass the greater portion of the day in sleep, hanging motionless; ranged in succession, with the head downwards, the membrane contracted about the body, and often in close contact, they have little resemblance to living beings; and by a person not accustomed to their economy, are readily mistaken for a part of the tree, or for a fruit of uncommon size suspended from its branches."

These bats destroy immense quantities of every kind of fruit. Their flesh is eaten by the natives. The kalong is of a brownish colour, darker on the back, with the top of the head and neck tawny, and the muzzle, ears, and wings black. The colour is subject to variation, a uniform black tint pervading the whole body in some specimens.

KAL'UDON or **KALYDON.** See CALYDON.

KALUGA, a government of European Russia, bounded W. and N.W. by Smolensk, N.E. by Moscow, E. by Tula, and S. by Orel. The area measures 29,594 square miles; the population is about 1,000,000. The surface is level, but here and there broken by a low hill or the wooded banks of the numerous rivers that flow through it. Forests cover about half the area, the arable lands about one-third. The soil for the most part is sandy clay. The Oak and its numerous feeders are the principal rivers. There are lakes and marshes in the centre and west of the government. The rivers, several of which are navigable for barges, or available for floating timber, are frozen from November to March. The chief products are rye, oats, barley, wheat, hemp, flint, and flax. Barely enough for the consumption is produced. The mineral products are bog-iron, mill-stones, lime, gypsum, and turf. There are several great iron forges. The manufactures comprise metallic goods and cutlery, cotton, leather, beet-root sugar, soap, and distilling. The commerce is principally with Archangel. Oil and spirits are exported. Sailcloth is made both for the European and American market, and coloured cloths for the China trade.

KALUGA, the capital of the above government, is situated on the Oka, and has 35,000 inhabitants. It was formerly surrounded with a rampart, now converted into a public walk. The streets are narrow, and for the most part consist of wooden houses. The best buildings are the bishop's palace, the residence of the governor, and the principal church. There are manufactures of muskets, cloth, oil, paper, cotton, pottery, soap, and vitriol, tanneries and sugar refineries; and a good trade is carried on in corn, sheepskins, Russian leather, and wax. The town is famous throughout Russia for a kind of cake largely manufactured in it. Kaluga has long been a place of banishment for political offenders.

KALUP'SO or **KALYPSO.** See CALYPSO.

KAMA'LA is a substance obtained from the fruit of the *Rottlera tinctoria*, natural order Euphorbiaceæ, and largely used in medicine as a remedy for tapeworm. It is a red powder, yielding to alkalies and alkaline carbonates a deep red colouring matter, which contains a yellow crystalline substance called rottlerin (C₁₁H₁₀O₈). It is

obtained in silky crystals, which are soluble in alcohol and ether, but insoluble in water, and which impart a deep red colour to alkaline solutions.

KAMBUSES or KAMBYSES. See CAMBYSES.

KAMES are long winding ridges of clean stratified sand and rounded gravel that occur in many parts of Scotland; they are similar to the Irish *ESKERS* and Swedish *åsar*, and were probably formed during the ICE AGE. These ridges often extend for very long distances; the sides are usually steep, and the stratification parallel to the outer surface; false bedding often occurs. Sometimes the ridges inclose a circular area of greater or less extent, without any lateral outlet; in this area a small lake or peat bog not uncommonly lies. The origin of these peculiar formations is doubtful; their occurrence in closed circles prohibits the possibility of having been carved out of pre-existing formations; the oblique stratification and kindred phenomena show that the waters in which they were deposited were subject to strong and varying currents. It appears probable that the material of which they are composed is in most cases rearranged boulder clay, and that its present disposition was effected in shallow seas; but whether the currents were produced by the ebb and flow of the tide, or from inflowing rivers, from melting glaciers, &c., or not, it is impossible to say.

KAMPTULICON. See FLOONCLOTH.

KAMTCHATKA, a peninsula projecting from the north-eastern parts of Asia into the Pacific, in a direction nearly due south, lies between 51° and 59° 55' N. lat., and between 155° and 165° E. lon. Its length is above 800 miles, and its width varies between 30 and 200 miles. The interior of the peninsula is generally rugged. A mountain range running east of the river Kamtchatka is distinguished by several high summits, which are of volcanic origin, and most of them still active. One of these summits, the Kluchovskaya, is about 15,000 feet above the sea-level. The mountains approach close to the eastern coast, which is composed of high rocks, rugged cliffs, and bold promontories, forming numerous inlets, the entrances to which are blocked up by reefs of rocks. The western shore, along the Sea of Okhotsk, is very low and sandy. The best part of the peninsula is the vale of the Kamtchatka River, which towards its southern extremity is 40 miles across, but grows narrower as it proceeds northward. Its length is 180 miles. Its soil is deep and rich, composed of a black earth, and exhibits a considerable degree of fertility. The Kamtchatka River, about 250 miles long, is the only important one in the peninsula.

The climate of Kamtchatka, when compared with that of Europe under the same latitude, is very severe. Winter generally lasts nine months, and frost is common even in summer. During the winter a great deal of snow falls. In the interior, where, protected by the mountains, the climate is milder, the larch tree, and rye, barley, buckwheat, potatoes, white cabbages, turnips, radishes, and cucumbers are grown. The number of horses and cattle is on the increase, but the most valuable animal in the peninsula is the dog, which is a kind of half-breed between the mastiff and the wolf, and has the peculiarity of never barking. They cheerfully work hard, and draw the sledges for days and even weeks together with very little food. The natives formerly lived chiefly on the produce of the chase; but since the number of wild animals has considerably decreased, fishing is more attended to. Fish is very abundant on the coasts. The forests contain many fine timber trees, which are little used, but might be employed in shipbuilding. The mineral wealth is little known; in some places there is iron ore, and sulphur in immense beds is found in the vicinity of the volcanoes.

Two native tribes inhabit the peninsula, the Kamtchadales in the south and the Koriakes in the north. The Kamtchadales are short, but stout, and broad in the

shoulders, with large heads, flat and broad faces, prominent cheek-bones, thin lips, lank black hair, and eyes deeply sunk in the head. They evidently belong to the Mongol race. The Koriakes are principally distinguished from them by the smallness of their head. Both nations differ in language and in mode of life. The Kamtchadales are huntsmen and fishermen, while the Koriakes are a wandering tribe, subsisting on the produce of their numerous herds of reindeer. The population is estimated at 6000.

The export of goods is carried on in sledges, the principal articles of commerce being sable, fox, and other skins (about 30,000 annually), whale oil, fish, and eggs. The trade is chiefly with Okhotsk, and the imports consist mainly of colonial goods.

The principal towns are Petropaulovski, Nishnei, Kamtchatka, and Bolshereck; but their population and commerce are very inconsiderable. Kamtchatka was discovered and conquered by Russia between 1696 and 1705.

KANAGA'WA is the name of the principal seaport of Japan, on the main island of the empire, in the bay of and 15 miles south from Tokio, of which city it is the port, and with which it was connected by railway in 1872. It is a long narrow town, stretching for nearly 3 miles along the bay, and having only one main street. The population is about 8000. The houses are built chiefly of wood, and the shops are large and well supplied. The shores of the bay are very beautiful and covered with villages, while the view inland is bounded by the cone of the large mountain Fujiyama. Kanagawa was opened to commerce in 1858, and now has a good foreign trade. The number of vessels which annually enter and clear from the port is each between 300 and 400, of which rather over a third is British. The principal articles of export are raw silk, tea, silkworms' eggs and cocoons, and raw cotton. The imports consist chiefly of cotton and woollen manufactures, yarn, arms, iron, tin, leather, ivory, rice, and sugar.

KANDAHAR' (Candahar), the chief town of a province of the same name in Afghanistan, is situated between the Argandab and Lurak Rivers, 80 miles south-west of Khelat-i-Ghilzai, 233 miles south-west of Ghazni, 318 south-west of Cabul, and 380 south-east of Herat. The population of Kandahar has been very variously estimated: Elphinstone gives 100,000, Hough 80,000, Masson 25,000 to 30,000, Ferrier 30,000, Court 25,000, and Bell 15,500. But these great discrepancies may be reconciled by supposing that the population increases and diminishes according as the government is protective or oppressive. Kandahar is probably capable of holding from 50,000 to 80,000 inhabitants. The town is situated on a level plain covered with cultivation. On the south and east are detached hills, on the north and west a low ridge. Its shape is an irregular oblong, the length being from north to south, with a circuit of 3 miles, 1000 yards. It is surrounded by a ditch, 24 feet wide and 10 feet deep, and by a wall which is 20 feet thick at the bottom, 14 feet thick at the top, and 27 feet in height. The wall is made of mud hardened by exposure to the sun, without revetment of stone or brick. The length of the west face is 1967 yards, of the east 1810, of the south 1315, and of the north 1161. There are six gates. The four principal streets are about 40 yards wide, and are lined with shops and houses. The houses generally are built of sun-dried bricks and are flat roofed, and some are upper-storied. The houses of the rich are inclosed by high walls, and contain three or four courts with gardens and fountains. The citadel is situated at the north of the city.

The trade between Kandahar and Herat and Meshed is carried on principally by Persians, who bring down silk (raw and manufactured), copper utensils, guns, daggers, swords, precious stones (turquoise), brocade, gold and

silver braiding, Belgian ducats, horses, carpets, &c., and take back wool, felts, postins, and skins of the fox, wolf, &c. Till 1830 the trade was considerable, and also during the British occupation; but after the return of Kohan Dil Khan in 1843, his tyranny drove away the principal merchants. The chief manufactures of Kandahar are silks, felts for coats, and rosaries of a soft crystallized silicate of magnesia, found near the city. The vine is very extensively cultivated in the suburban gardens of Kandahar, which produce no less than nineteen different kinds of grapes. The bazaars are well supplied with good and cheap provisions, and excellent fruit is abundant—apricots, pomegranates, quinces, figs, plums, peaches, apples, mulberries, &c. Dried fruit forms the great staple of the place.

From the remotest times Kandahar must have been a town of much importance in Asia, as its geographical position sufficiently indicates, it being the central point at which the roads from Herat, Seistan, Ghor, India, and Cabul unite, and the commercial mart of these localities. Kandahar is supposed to have been one of the seven cities built in the interior of Asia by Alexander the Great, on the ground that Kandahar or Kandahar is an abbreviation of the name Iskandar. During the last 150 years Kandahar has figured conspicuously in history. In 1737 Nadir Shah, with an army of 100,000 men, blockaded the place for eighteen months. It was then stormed, and after a gallant resistance the commandant surrendered. In 1834 Shah Shuja marched against Kandahar with 22,000 men, but was compelled, after a desperate series of struggles lasting fifty-four days, to retire. The next time Shah Shuja appeared on the field it was with the support of the British government. The army of the Indus took possession of Kandahar on the 20th April, 1839, without any resistance being attempted. On the march of the army to Ghazni and Cabul a force of three batteries of artillery and two regiments of infantry and a regiment of cavalry was left. This was afterwards increased, and General Nott arrived to take command in November, 1839. Throughout 1840 and most of 1841 affairs remained quiet at Kandahar, thanks to the good management of Rawlinson and Nott. But in September of the latter year the first signs of the coming storm were visible in the stoppage of communication between Kandahar and Ghazni. No attempt, however, was made to lay siege to Kandahar by the rebel Duranis. An army of them under Safdar Jang, Sadozai, hovered about in the vicinity, plundering the villages, and by every possible means urging the inhabitants to join in an attack on the British troops. In the beginning of March, 1842, he commenced to approach too closely to the city itself; and General Nott moved out to meet him, leaving 2600 men in the city. He signally defeated Safdar Jang; and in his absence an unsuccessful attempt was made to carry the place by a night assault. No other attempt was made against the city during General Nott's time; and on the 8th August, 1843, he evacuated it on his march to Cabul, taking with him Timur Mirza, whom he had in vain endeavoured to induce to remain. Safdar Jang then took possession, but in four months he was driven out by Kohan Dil Khan, who returned from Persia. This chief commenced a reign of gross tyranny and spoliation, which reduced the inhabitants of Kandahar to the last ebb of despair—a state from which they were only relieved by his death in 1855. His son, Mohammed Sadik, then came to Kandahar, seized the property and valuables of his deceased father, which proceeding giving great offence to his uncle Rahim Dil Khan, that chief invited the interference of Dost Mohammed, who accordingly arrived and took possession of the city in November, 1855, apparently without opposition, and appointed his son, Ghulam Haidar Khan, governor. This chief was still governor when Lumsden's mission arrived in 1857, but he died soon after its withdrawal. Shere Ali Khan appears to have succeeded

Ghulam Haidar Khan as governor of Kandahar, and on his becoming ameer his full brother Mohammed was appointed in his stead. This chief, however, joined the rebellion against Shere Ali, and was killed in the battle of Kajbaz, on the 6th June, 1865, where he had advanced to meet him. His brother, Mohammed Sharif, fled to Kandahar, and after a vain attempt to raise partisans surrendered to the Ameer Shere Ali Khan, who consequently, on the 14th June, 1865, took possession of Kandahar. After the defeat of Shere Ali Khan at Khelat-i-Ghilzai on the 17th of January, 1867, Kandahar passed from his grasp to that of Azim Khan, his half-brother and rival. But after the battle on the Helmand on the 1st April, 1868, Kandahar again fell into the power of Shere Ali through his son, Yakub Khan.

In the campaign of 1878-79 Kandahar was occupied by the British troops, and held by the Quettah column until the end of the war. The flight and death of Shere Ali, the Ameer of Afghanistan, who had forced the British into hostilities with him, practically brought the campaign to a close, and an advance which was contemplated by the Quettah column from Kandahar was countermanded before any operations of first-rate importance had been carried out from that base. Kandahar was restored to Afghanistan on the conclusion of peace with Yakub Khan and his acceptance of the British terms in 1879.

On the resumption of hostilities to avenge the murder of the British ambassador, Sir Louis Cavagnari, Kandahar was reoccupied in September, 1879, by a British force under General Stewart. The Wali, or ruler, appointed by Yakub Khan was not, however, disturbed, and continued to conduct the government of Kandahar city and province. In June, 1880, Ayub Khan, a claimant to the throne of Afghanistan, marched from Herat to occupy Kandahar. The troops of the Wali mutinied and joined Ayub's forces, which in July defeated a brigade of our troops under General Burrows, and invested Kandahar. General Roberts, however, proceeded from Cabul to Kandahar by a rapid and brilliant march, and completely defeated Ayub Khan, who fled with a handful of followers to Herat. Kandahar now forms part of the dominions of the Ameer of Afghanistan.

KANDAKE. See **CANDACE**.

KANDAU'LES. See **CANDAULES**.

KANDY, the former capital of Ceylon. See **CANDY**.

KANE, ELISHA KENT, M.D., a celebrated American traveller and arctic explorer, was born at Philadelphia 3rd February, 1820. He studied at the University of Virginia, and adopting the medical profession, obtained his doctor's degree in 1842. The following year he entered the United States' navy as surgeon, and being sent on a voyage to China, he managed on the way to travel through some parts of South America and the island of Luzon, and on his return home under leave of absence he visited India, Persia, Syria, Egypt, Greece, and Western Europe. In 1846 he was sent to the west coast of Africa, where he visited Dahomey, but being attacked by fever he was invalided home in 1847. He then exchanged into the military branch of the service, and served with the army in Mexico. In 1850 he was appointed surgeon and naturalist to the first Grinnell expedition in search of Sir John Franklin, remaining away sixteen months. He also accompanied the second expedition, which set out in June, 1853, and remained away until 1855. During the two winters the expedition endured terrible suffering, but Kane never ceased to pursue his scientific researches, obtaining many valuable results, which were afterwards published. On his return home he received many valuable marks of public approval, but his health was permanently injured, and though he visited England and afterwards sailed to Cuba in hopes of benefit, he died at Havana 16th February, 1857, at the early age of thirty-seven. His chief works are "The United States' Grinnell Expedition in Search of Sir John Franklin,"

published in 1854; the "Second Grinnell Expedition" (two vols., Philadelphia, 1856), and the scientific observations made during the second expedition were published in the "Smithsonian Contributions to Knowledge" (vol. x.-xiii., 1858). A biography of Kane, written by W. Elder, M.D., was published at Philadelphia in 1857.

KANGAROO (Macropodidae) is the name of a family of marsupial mammals (MARSUPIALIA) exclusively confined to the Australian region. The first recorded observation of these animals by Englishmen was in 1770, on the north-east coast of Australia, by Captain Cook. Skins of the animal then discovered were brought to England, where they were recognized as belonging to an animal akin to the American opossums. This animal was subsequently named *Macropus giganteus*, and is now well known as the great kangaroo. Sixty years previous, however, the Dutch traveller Bruyn described another species of kangaroo (now named *Macropus brunii*), specimens of which he saw living in captivity in a garden at Batavia. A great number of species of kangaroos are now known, divided into several genera, and forming the family Macropodidae.

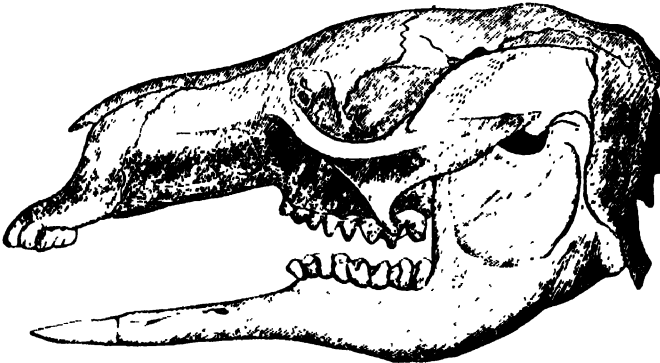
The kangaroos are readily distinguished by the disproportionate bulk of the hinder parts of the body as compared with those in front. Locomotion is usually effected solely by the agency of the long and powerful hind limbs, the

The canines fall out at an early age in the common kangaroos, but are persistent in the rat kangaroos (*Hypsiprymnus*). The anterior premolar falls out early, so that the adult possesses only a single premolar. The molars have square crowns with transverse ridges. The stomach is large and complex. There is a long cæcum.

The young of this family of marsupials are born in a very immature state, that of the great kangaroo being a worm-like, semi-transparent little creature, about an inch in length. In this helpless condition it is placed by the mother in the marsupial pouch, and hangs on to one of the long nipples. As it is unable to actively suck, the mother squeezes her own milk-gland, and so injects milk into its stomach. To obviate the danger of suffocation the upper part of the larynx, instead of opening into the floor of the mouth, rises up into the back part of the nose, so that breathing goes on independently of the mouth. The young kangaroos, even when fully capable of an independent life, often temporarily return to the pouch for shelter or transport.

The kangaroos feed for the most part on herbage, but some species eat roots. When feeding they usually apply the fore limbs to the ground.

The Great Kangaroo (*Macropus giganteus*) is the largest living native of Australia, being about 6 feet high when standing on its hind legs. The herbivorous kangaroos are too large to fall a prey to the carnivorous marsupials, but the balance of nature is more than redressed by the great carnivore, man. The natives spear them, and the colonists hunt them with trained hounds or shoot them. The pursuit of the kangaroo with dogs affords an exciting, but often arduous and fruitless chase. When at bay the kangaroo is a dangerous opponent to a dog or even a man. An old male kangaroo will seriously wound, or even kill a man, by "hugging" him with its fore paws, and then ripping him up with the hind feet. According to Gould the kangaroo when at bay sometimes seizes a dog in its fore



Skull of the Great Kangaroo (*Macropus giganteus*).

animal progressing by a series of great bounds, the body being inclined slightly forwards, and the balance maintained by the tail being thrust out. When at rest these animals usually assume an upright position, supported partly by the hind feet, partly by the long thick tail. The hind limbs are greatly elongated, especially in the region of the foot. The hind foot has only two conspicuous digits, the inner of which, the fourth digit, is very large, and bears a long straight-pointed claw, while the fifth digit has a smaller claw. The second and third digits are long and slender, united in a common fold of skin, so as to appear like a single toe furnished with two small claws. The great toe or hallux is absent. The powerful claw of the fourth toe forms the chief weapon of offence. The fore limbs are short and related in function chiefly to the marsupial pouch and to feeding. All five digits are developed, each provided with a compressed curved claw. The forearm is capable of very free movement. In the hind limb the femur is short, but the tibia and fibula are of great length. The metatarsals are greatly elongated. The marsupial bones are well developed. The head is small, tapering towards the snout; the upper lip is cleft and the muzzle hairy in the typical forms. The eyes are large and full; the ears are large. The brain-case is small. The complete dentition is expressed by the formula—

$$I. \frac{3-3}{1-1}; c. \frac{1-1}{0-0}; pm. \frac{2-2}{2-2}; m. \frac{4-4}{4-4} = 31.$$

paws, leaps away with him to the nearest piece of water, and holds him under till he is drowned. The great kangaroo and others of its kindred breeds freely in this country. The flesh has been compared in flavour to venison.

The Macropodidae are divided into two subfamilies, Macropodinae, the true kangaroos, mostly confined to the continent of Australia and Tasmania, but with a few species in New Guinea and the surrounding islands; and Hypsipryminae, the KANGAROO-RATS or POTOROS, presenting important differences in the dentition, and confined to Australia and Tasmania.

The true kangaroos may be divided into four genera, *Macropus*, *Lagorchestes*, *Dendrolagus*, and *Dorcopsis*. The species of the typical genus *Macropus* are very numerous, and vary considerably in size and habits; they present minor differences in the comparative development of the fore and hind limbs and in the form of the tail.

The Rock Kangaroos, of which *Macropus penicillatus* may be taken as the type, have comparatively short stout hind limbs with short nails and a large cylindrical tail, bushy at the tip. They are gregarious and nocturnal, and inhabit rocky mountainous regions, making their retreat in holes and caverns. The Brush Kangaroos or Wallabies are small kangaroos inhabiting dense forests; one species, *Macropus thetides*, is only 20 inches long exclusive of the tail.

The Hare Kangaroos (*Lagorchestes*) are about the size of the common hare, which they resemble considerably in

form and habits. They are solitary and nocturnal in their habits, sleeping on a "form" like the hare. The muffle is hairy, and the limbs short.

The Tree Kangaroos (*Dendrolagus*) are chiefly arboreal in their habits, feeding on leaves and fruits. The fore and hind limbs are nearly of the same length, and are provided with strongly-curved powerful claws; the tail is longer than the body. Two species only are known, *Dendrolagus inustus* and *Dendrolagus ursinus*, both natives of New Guinea.

Fossil kangaroos, often of large size, are abundant in the pleistocene deposits of Australia. No fossil remains that can with any certainty be referred to this family have been found in other quarters of the globe.

KANGAROO-RAT or POTOROO are names given to a group of small kangaroo-like animals inhabiting Australia and Tasmania. They form the subfamily Hypsipryminæ of the family Macropodidæ. The kangaroo-rats differ remarkably from the true kangaroos, which form the subfamily Macropodinæ, in their dentition. The front incisor teeth in the upper jaw are curved and exceed the others in length. The canines of the upper jaw persist permanently. The premolars are very long with compressed crowns, and their outer and inner surfaces are sculptured by numerous vertical grooves. The molars have square crowns with four blunt conical cusps, and the last is small and sometimes absent. The fore feet are narrow with the two outer toes very small comparatively. The hind feet resemble those of the true kangaroo. The ears are large and round. The body is stout and compact. The tail is long, sometimes prehensile, and slightly tufted at the tips.

The kangaroo-rats are never bigger than a rabbit. They build nests of grasses, in which they remain in the daytime. Their food consists of grasses and leaves, and also of roots which they dig up with their fore paws. Ten or twelve species have been described, of which *Hypsiprymnus macrinus*, *Hypsiprymnus penicillatus*, *Hypsiprymnus rufescens*, all inhabiting New South Wales, are common. A kangaroo-rat (*Hypsiprymnodon moschatus*) has been recently found in North-eastern Australia, which differs from all the kangaroos in having a small great-toe, which is prehensile and nailless.

KANSAS, one of the United States of North America, admitted into the Federal Union in 1861, extends from 37° to 40° N. lat., and from 94° to 102° W. lon. Its length is 400 and its breadth 208 miles, the area being 81,318 square miles. It is separated from Utah by the territory of Colorado and the Rocky Mountains, and is watered by the Kansas, Missouri, and Arkansas rivers, the first of which rises in the Rocky Mountains, flows in an easterly direction 900 miles to the Missouri, and is navigable to Fort Riley. The climate generally throughout the state is very fine. The soil is fertile, producing all the cereals, with cotton, hemp, tobacco, and fruits. It is one of the most grazing states in the west, and the farms are well stocked with cattle. The prairies contain an abundance of game, including the buffalo, deer, antelope, wild turkey, wild goose, and prairie hen. Coal, gypsum, quartz, porphyry, limestone, sandstone, and lead are among the minerals.

Kansas is well supplied with religious and educational institutions, has a Senate of twenty-five members, and a House of Representatives of seventy-five members. The population in 1860 was 107,206; in 1880 it had risen to 395,262. The state is divided into forty-five counties; the principal towns are Topeka, the capital, on the south side of the Kansas River; Leavenworth, the largest city, situated on the Missouri River; Atchison, also on the Missouri; and Lawrence, a fast rising town, with a population of 8320. Kansas was formed into a territory in 1854, and was the scene of bitter struggles between the

advocates and opponents of slavery. The constitution under which it was admitted into the union prohibited slavery.

KANT, IMMANUEL, the greatest of metaphysicians, was born on 22nd April, 1724, at Königsberg, the chief town of Eastern Prussia, the seat of an ancient university, surrounded by a flat uninteresting country, and enveloped in a cold and damp atmosphere. There he passed his days in continuous solitary thought, and in the work of lecturer, and later on of professor of logic and metaphysics in the university. From thence he sent forth an influence that has caused the greatest revolution which metaphysical science has ever experienced. The lonely methodical life of this philosopher, which abounds in moral and intellectual grandeur, is almost barren of the interest connected with external incidents. The spirit of that life is now revealed in his writings, as it was also when he laboured on earth, by the purity, dignity, and singular simplicity with which he regulated its course. Kant's father, John George Kant, was a saddler in Königsberg, the son of a Scotchman who left his native country, as it appears, in the end of the seventeenth century, at a time when not a few of his countrymen went to settle on the shores of the Baltic. The name was originally spelt Cant. Nothing very definite is known about the philosopher's grandfather. Branches of the family, it is said, are still to be found in Aberdeenshire. In the reign of Charles II. the head of the university of Edinburgh was Principal Cant; and about the same time another individual of that name was celebrated as a Covenanting preacher. The great philosophical representative of the name inherited the stern integrity of his Presbyterian ancestors, tempered by the affectionate piety of Anna Regina Renter, his mother, who was a genuine German. Kant, all his life, remembered his parents and his early home with deep love and reverence. When he was thirteen years old his mother died—her first and last desire for Immanuel being that he should be trained for the ministry in the Lutheran Church. His father survived till he was twenty-two. Kant was the fourth child in a large family, none of them distinguished except himself. His boyhood was passed in the "Friederick" gymnasium at Königsberg under Dr. Schultz, an evangelical clergyman of the city. Latin, especially Virgil and Horace, was his chief pleasure at the gymnasium, in which Ruhnken, afterwards a celebrated philologist, was his companion. Kant read the Roman literature with interest throughout his life. In 1740 he entered the University of Königsberg as a student of theology, the chair in that department being also occupied by Schultz. At the university he worked much in the higher mathematics and the physical sciences; but neither then nor for years after did any marked metaphysical tendency appear. He also preached occasionally as a theological student in the neighbouring country churches; but in this capacity he seems to have met with little success. Finding ecclesiastical life uncongenial to him, as well as probably from some change in his view of theological doctrine, he soon abandoned his preparations for the church to devote himself to the university and to philosophy. In 1746 his father's death forced him to face the financial problem of life, and he accepted a situation as private tutor in the family of a clergyman near Königsberg. He passed in this way nine years of his life, from 1746 to 1755, in a succession of families—a period to which he always looked back with pleasure as that in which he laid the foundation of his philosophical eminence, while he was enlarging his knowledge of the world in refined society. In 1747, at the commencement of this period chiefly of country life, he published his first work, "Thoughts on the True Measure of Living Forces"—an able criticism of the doctrine of Leibnitz.

In 1755 Kant closed his tutorial life in private families, and returned to Königsberg, with the view of permanently

connecting himself with the university, and of ultimately obtaining office as one of its professors. He commenced his academical career as a *privat-docent*, and accordingly took his degree as doctor in philosophy, when he delivered two theses, one on physics and the other on the first principles of metaphysics. But in 1756 the Prussian government suppressed the extraordinary chair of philosophy, which Kant hoped for at the death of its professor; and in 1758 the professorship of logic, which fell vacant, was given to another. Only in 1766 did he get any salaried office and that was a librarianship worth only £10 a year. For fifteen long years, from 1755 till 1770, Kant taught in poverty as a private lecturer in the university. During this period he described in his lectures almost the whole circle of human knowledge, showing a marked affinity for the material sciences, especially astronomy and physical geography, to both of which he had a special predilection. This was a fifteen years of brave struggle and extraordinary activity. As a lecturer he was very popular, and attracted many distinguished persons to his class-room. As an author he was at this time most prolific. The products of his pen were given to the world in form of reviews, pamphlets, and larger treatises, in which he proved his great knowledge and intellectual power, but in which his future philosophy was still only faintly signified. In 1755 he published anonymously, and dedicated to Frederick the Great, his "Theory of the Heavens," in which he attempted to explain the origin of the planetary system on Newtonian principles, predicting by means of the laws of motion the discovery of additional planets, which succeeding astronomers have since brought to light under the names of Uranus and Neptune, thus by his penetrating astronomical insight anticipating experience. He anticipated Laplace in his nebular hypothesis, just as he was to anticipate Comte in his sociological views. The astronomical genius of Kant had, among others, the homage of Herschel. Several tracts on mechanics and natural history, one on "Optimism," and another on "Emmanuel Swedenborg," appeared in the three or four following years. In 1762 Kant first came before the world as a logician, in his small but remarkable treatise on the "False Subtlety of the Four Syllogistic Figures," the last three of which he rejects as merely unnatural forms of the first. In the following year he published two works on theology. One of these is his essay on the "Validity of the First Principles of Natural Theology and Morals," which in 1763 obtained the *accessit* prize from the Berlin Academy, the first being adjudged to Moses Mendelssohn, afterwards his correspondent and friendly antagonist. The other, entitled "The only Possible Method of demonstrating the Existence of God," is an abler and more important work. He here seeks, in the spirit of the Wolffian philosophy, to substitute for the argument from design a proof founded on the abstract possibility of things; and he also offers some glimpses of the foundation of natural theology exclusively in our moral nature, on which he afterwards laid exclusive stress. A tract on the "Sublime and Beautiful," as well as programmes of his lectures on physical geography and other parts of his course, &c., also belong to this period. His fame was, meantime, gradually spreading over Germany, by means of his numerous students and publications. In 1764 he declined the offer of the chair of poetry at Königsberg; but soon after was appointed keeper of the royal library, with a modest salary. Kant was at last rewarded for the labours of these fifteen years in the way of all others most congenial to his taste. In 1770, after declining similar offers from Jena and Erlangen, he was elected to the chair of logic and metaphysics in the university of his native city, with a salary of £60 a year. In his famous thesis, "*De Mundi Sensibilibus et Intelligibilis Forma et Principiis*," published on this occasion, we at last find the germs of the critical philosophy afterwards delivered

to the world in the great treatises of the latter part of his life, a philosophy which we now see to have been brought to maturity with a slowness of development fitted to encourage some and warn others.

The professorial epoch of Kant's life commenced in 1770, and his active labours as a professor extended over twenty-seven years. Surely such teaching has been rarely to be had in this world. He gave one hour daily to logic or metaphysics; the others to some branch of applied philosophy, or to such a subject as physical geography or anthropology. One of his students has recorded that for nine years that he listened to Kant the great professor never missed an hour. These lectures had been crowded, sometimes even the vestibule and the steps, as well as the room itself, ever since he began them in 1755, for he made but very little alteration on account of his professorship in 1770. The great charm lay in the fact that his aim was not so much to impart knowledge, still less to defend a system, as to make his hearers think. He would often say, "You will not learn philosophy of me, but philosophizing; not thoughts, but thinking." His three rules of logic are equally noteworthy—"1. Think for yourself; 2. grasp the standpoint of others; 3. always think consistently. The first is the enlightened, the second the enlarged, the third the consequent method of thinking." The Count von Purgstall has left a sketch of him in his later years as "a little old man, bent forward as he sits, in a brown coat with yellow buttons, with wig and bag to boot, now and then taking out a hand from the close-buttoned coat, wherein both are thrust, to make a slight movement before his face, as a man does when wishing some one else quite to understand him." The whole portrait is full of me touches, but the following is all we may permit ourselves, and it is eminently characteristic of Kant:—"He lectures on an old *Logic* by Meier, if I mistake not. He always brings the book with him into lecture. It looks so old and stained, he must, I think, have brought it to the class for forty years. On every page he has notes in minute characters. Many of the printed pages are pasted over with paper, and many leaves struck out; so that, as you can see, almost nothing of Meier's *Logic* remains. Not one of his hearers brings the book to lecture; they merely write to his dictation. He does not, however, appear to notice this, and follows his author with much fidelity from chapter to chapter, and then corrects him—or rather flatly contradicts him—but all in the greatest simplicity, and without the least appearance of conceit over his discoveries." From 1770 to 1781 he published only one work, a programme of lectures on ethnography. In these eleven years he was patiently working out a theory of human knowledge and life which might be substituted for the hypothetical systems of the past, as a sufficient bulwark against the prevailing scepticism of the age of David Hume and the French encyclopedists. The question of the possibility of metaphysics, and of the necessary limits of the intellectual power of man, formed the great problem which he attempted to solve. The first part of his solution appeared in July, 1781, in the greatest of his works, the "*Critique of the Pure (or Speculative) Reason*," which contains a review and reconstruction of the whole theory of human knowledge. The "*Essay*" of Locke and the "*Critique*" of Kant have been by far the most influential books in modern metaphysical literature. The same general problem is dealt with in each, by Locke with extraordinary good sense and practical intuition, and by Kant with unequalled subtlety and boldness. Each was a publication of the mature opinions of its author, for Locke and Kant were fifty-seven years of age when their greatest works were given to the world. But the point of view from which the "*Essay*" was written was in many respects different from that of the "*Critique*." Locke, in 1690, was struggling against the pedantic formalism and verbal disputations of the schools,

as well as the civil and religious intolerance of his age, and his metaphysic was a reasoned protest on behalf of the duty of private judgment. Before Kant published his great work in 1781, the metaphysical dogmatism of Wolff had restored much of the empty notionalism which Locke, in conducting men's minds to nature and reality, sought to destroy; and, above all, the received assumptions and systems of the past had been shattered by the sceptical criticism which renders the publication of the philosophical works of David Hume, about 1740, the mark by which the later is separated from the earlier period in the history of modern philosophy. "I freely allow," says Kant, "that it was Hume's suggestion in his theory of causation that first awakened me from my many years of *dogmatic slumber*, and directed my speculative researches into a new quarter. I did not accept Hume's inferences, for I saw that he had drawn them from a partial and one-sided representation of the whole problem." The Scottish scepticism thus induced the reconstructive criticism of Germany, of which the first and most laboured instalment was produced, as has already been said, in 1781. The book was at the outset, as we might expect, misunderstood, and indeed, like Hume's own "Treatise on Human Nature," was at first in danger of falling still-born from the press. Kant accordingly, in 1783, explained and popularized his design, in an introduction to his critical philosophy, entitled "Prolegomena to every Future System of Metaphysics claiming to be a Science," which called forth much attention and controversy. A consequent demand for the second edition of the "Critique" was satisfied in 1787. The "Critique of the Pure Reason" constitutes the fundamental part of the Kantian metaphysics; but it supplies only the foundation of the analysis even of speculative reason. It seeks to resolve the origin and abstract validity of the principles of knowledge, not the application of these principles to the knowledge of nature. A metaphysic of nature had still to be supplied. This Kant provided in 1786, in his "Metaphysical Elements of Physics," or an *a priori* analysis of the elements which constitute matter, by him explained under the conception of force, instead of by the old and traditional conceptions of solidity and impenetrability. This work is in some sort a supplement to the earlier metaphysics of Leibnitz, and an anticipation of the later philosophy of nature by Schelling. The years immediately following 1781 were also marked by several minor publications of Kant—in physics, the philosophy of history, and ethnology. It was not until 1788 that the *second* part of his great philosophical system was given to the world—the "Critique of the Practical Reason," which forms the central part of his moral system, as the earlier "Critique" is of his purely speculative philosophy. The two are, in fact, correlative. While the analysis of reason, viewed as practical, implies a previous analysis of pure intelligence, the latter is incomplete and must be misunderstood if the results of the former are left out of account. Other works of Kant which appeared about this time should be compared with the second "Critique" in order to attain a comprehensive knowledge of his ethical system, and of the genius of his philosophy as a whole—in particular the "Groundwork of Ethics," published in 1785, as well as the "Metaphysical Elements of the Science of Law," and the "Metaphysical Elements of the Science of Morals," published about ten years later. The two last are related to the analysis of the practical, very much as the "Metaphysical Elements of Physics" are to that of the speculative reason. This group of Kant's writings supplies the keystone to his metaphysic arch. It embodies an ethical doctrine marked by a severe and almost unequalled grandeur, and resting on a basis that is absolute and eternal. In this highest part of his system, Kant's recognition of duty as *absolute* virtually heals the wounds which his theory of truth as *merely relative*, that is, intertwined

with its other parts, might seem to have inflicted, and restores that intercourse with reality which his previously demonstrated narrowness of human understanding appeared to forbid. After these two criticisms of reason—in its relations to science, and in its relations to life and duty—had been completed, the third and last part of the philosophical edifice of Kant had still to be constructed. His first criticism analyzed man exclusively as intelligent—as related to knowledge and existence; his second, as also endowed with will—a responsible agent under law. It still remained to examine human nature as endowed with sensibility or feeling. This was attempted in the "Critique of the Judgment" in 1790, which may be said to complete the Kantian system in describing its relations to aesthetics and natural theology. This work is divided into two parts; one of these analyzes our sensibilities to beauty and sublimity and the fine arts; the other reviews the ends of nature, and contains a subjective theory of teleology.

Kant's life as an author did not close with his "Critiques." Physics, history, politics, and anthropology were discussed in various articles and treatises in the interval between 1790 and his death in 1804. But the most remarkable works of this closing period are those which relate to natural theology and the theory of religion. In 1792 the first part of his book on "Religion within the bounds of the Pure Reason" appeared in the *Berlin Journal*, and occasioned a collision on matters of theology between Kant and the Prussian government, by whom the publication of the remainder of the work was forbidden. Some of the German universities had, however, in questions of this sort, a right of appellate jurisdiction. Kant referred the case to the theological faculty of Königsberg, and the publication of the whole work, which appeared in 1793, was sanctioned by the university. The aim of the book is to represent the moral and spiritual part of Christianity as an element, that is, independent of the history and supernatural doctrines with which it is associated; and thus permanently to reconcile with reason all essential religious belief or feeling, by placing this last above the changes and chances of historical and scientific controversy. The *fact* of a miraculous revelation is left undecided. Kant confines himself to the theory of its possibility, urging at the same time that the only final proof of its truth must lie in the harmony of its contents with reason and conscience. Language like that contained in this work naturally occasioned opposition, not merely among the ignorant and bigoted, but among devout and thoughtful persons. Kant was at the same time visited by the displeasure of the king, who exacted a pledge from him to refrain in future from lecturing or writing on questions of theology—a pledge which he observed till the death of Frederick in 1797, which, according to his understanding, set him free from the engagement. He then pressed his theory of religion anew on the world in another work, along with the correspondence to which his former essay had given rise. This theological collision seriously affected the tranquillity of the aged philosopher. He gradually withdrew from society, and about 1797 closed his public labours in the university with which he had been associated, first as a lecturer, and afterwards as a professor, since 1755.

Kant's life after his retirement from the chair showed a gradual decay of bodily and mental power. One of his last efforts as an author was a condemnatory criticism of Fichte, whose system was then rising into notice. Kant's "Logic" and his "Physical Geography" were given to the world by his pupils; the former in 1800 by Jäsche, and the latter by Rink in 1802. About this time his memory began to fail, and he suffered much from weakness and restlessness. On the 12th of February, 1804, he peacefully passed away, within about two months of his eightieth year; and a few days after his mortal remains were lowered into the academic vault of Königsberg, in presence of the univer-

sity and a great multitude of spectators from all parts of Prussia.

In the first forty-six years of his life Kant had to struggle with poverty, and it was not till he was elected professor in 1770 that he had the means of maintaining a household of his own. He possessed a small fortune when he died, the result of the undeviating economy of a long life. He was never married. His daily life was marked by unbroken regularity. He was small, thin, and constitutionally feeble; but by a curiously careful attention to the laws of health he was almost never ill during all his long and laborious life, and he preserved the studious habits which he formed in youth, on principles of reason and experience, into extreme old age. During his professorship, his man-servant Lampe awoke him all the year round at a quarter before five. Soon after, he received his morning meal—a cup of tea, rarely two, and one pipe of tobacco; nothing more. After this he read or meditated till seven, when he went to lecture. His lectures were for the most part extemporaneous, founded on a few jottings—written on slips of paper or on books—the fruits of deep previous thought. He never delivered doctrine which he had not pondered much and long, and his wonderful memory readily supplied the abundant analogies and anecdotes by which he illustrated what he delivered. Unlike his books, his lectures were expressed in an easy conversational style, and presented suggestive principles, from which the reflective part of his audience might unfold his subject for themselves, rather than an exhaustive exposition or system. After lecturing he spent the day till one o'clock in his study. At one what was with him the social hour of the day commenced. He dined, and almost always had some friends to join him then—professors, physicians, ecclesiastics, merchants, foreigners, and young students—whose varied talk was one of his chief daily pleasures and means for gaining knowledge. On these occasions Kant usually banished his philosophy, and talked with great interest on physics, politics, and the ordinary topics of the day, often prolonging the conversation till the afternoon was far spent. His solitary walk, which no weather or change of season ever interrupted, followed soon after dinner. It was usually taken alone, that he might meditate in quiet. Heine says in his felicitous way, "I do not believe that the large clock of the cathedral did its daily work with less passion and with greater regularity than its countryman, Immanuel Kant. To rise, drink coffee, write, deliver lectures, eat, take walks, everything had its appointed time, and the neighbours knew that it was exactly half-past three o'clock when Kant, in his gray coat, and with his Spanish reed in his hand, stepped out of his door, and walked towards the small hidden avenue, which is still called after him the Philosopher's Walk (or was, till the railway station almost entirely destroyed it). Eight times he walked up and down there, at all seasons of the year; and when the weather was unfavourable, or the gray clouds portended rain, his old servant, Lampe, might be seen wandering anxiously behind him, with a large umbrella under his arm, like a picture of Providence. Strange contrast," as Heine sarcastically adds, "between the outer life of this man and his destructive world-crushing thoughts. The good people of Königsberg saw in him nothing but a professor of philosophy, and when he passed them they greeted him kindly, and perhaps set their watches by him." On his return he frequented the reading-room, for newspapers and politics were a great temptation to him. As the darkness began to fall, he would take his seat at the stove, and with his eye fixed on the tower of Löbenicht church would ponder on the problems which exercised his mind. One evening, however, as he looked, a change had occurred—the church tower was no longer visible. His neighbours' poplars had grown so fast that at last, without his being aware, they had hid the turret be-

hind them. Kant, deprived of the material support which had steadied his speculations, was completely thrown out. Fortunately, his neighbours were generous—the tops of the poplars were cut, and Kant could reflect at his ease again. The remainder of the evening till ten o'clock, when he retired to rest, was given to reflection, and in part, as the night approached, to light reading, by which he calmed his mind after the labour of philosophical thought, and invited sleep. Kant was a great thinker rather than a great reader, and his reading was very miscellaneous. Compared with Leibnitz, Cousin, or Hamilton, he knew little of the speculative opinions of the past, and was indifferent to the history of speculation—in this respect resembling Descartes, Locke, and Hume. His own collection of books was small, but he was accustomed to receive works in sheets from his publishers, and to read all the new catalogues. The furniture and general style of his house was of the simplest kind, and displayed the magnanimous independence of fashion and appearance which might be expected from his unselfish and stoical character. His life was a culture of reason and will, more than feeling, in which he was stoically reserved. His devotional sensibilities were probably feeble, and he seldom encouraged them by attendance at any public religious service. His knowledge of art was equally restricted, though equally sincere as far as it went; and his poetic tastes ranged within a very narrow and defective circle. His love for truth and honesty, and his philosophical independence, have been hardly equalled by the best and greatest men.

In Kant the subjective side of philosophy, as criticism proper, has reached its last stage. He defines his method as the *Kritik*, i.e. he draws the line between phenomena and that which transcends phenomena, and provides a logic for both. For want of ascertaining that this is the true meaning of the term *Kritik*, a great deal of nonsense has been written about transcendentalism, as if it were a new patent method of making known the unknowable, or of slinging Socrates in a basket up in the clouds. It must be admitted that Kant is himself the cause of his being so misunderstood. He not only cut a road for himself through the jungle of metaphysics, but also metalled it with his own materials, and the result is that it is as rough as one of those old Roman ways made with paving-stones taken pell-mell out of the nearest quarry or ruin. Then, again, his style is obscure even for a German. He wrote with fury, but forgot to correct with phlegm. He fell into the same mistake as Butler, and is obscure for the same reason, that he threw off for the press the laboured thoughts of a lifetime as if he were getting rid of some guilty secret. His obscurity of style by no means implies obscurity of thought. It is simply the result of haste in the first place, and afterwards of unwillingness to alter the first form. In five months Kant wrote, and that only in leisure hours, what had taken him eleven years to think out. The consequence of this is that Kant has had as many commentators as Aristotle, and the commentators have in the end to give up much as utterly insoluble. The looseness, too, of German syntax, to which the retention of inflexions leads a fatal indulgence, leads to the same obscurity which we meet with in the classics. A German sentence goes lumbering on like one of their *collegien* of the days before railways. On this subject De Quincey, who was a stylist himself, dilates with his usual force on the utter absence of style in Kant. He describes him as packing and stuffing one of his regular sentences pretty much on the model of one of those old family coaches: "Everything that could ever be needed in the way of explanation, illustration, restraint, inference, by clauses or indirect comment, was to be crammed, according to this German philosophic writer, into the front pockets, side pockets, or rear pockets of the one original sentence. Hence it is that a sentence will last on in reading while a man might reap an acre of his

neighbour's corn.' But this was not the worst, for Kant had a passion for coining uncouth and barbarous terms such as would have made Quintilian stare and gasp." For instance Kant's statement of the main question of the "Critique of the Pure Reason" is as follows:—"How are synthetic judgments *a priori* possible?" Now this may just as well be stated, "How can the individual mind get beyond itself? How can we *know*?" and every ordinary reader asks, of course, why did not Kant follow Hume's excellent example and strive for lucidity rather than add needless perplexity by retaining and adding to the old mediæval formulæ. But it was with his terminology as with his old Meier's Logic, he retained the dead-weight of logical jargon to the last, even though it was but an encumbrance to him.

The question of the "Critique" is in fact Hume's great question, "Can we know things or only thoughts?" It is manifestly absurd to rear vast structures of metaphysical subtlety until we have determined what things are knowable and what are unknowable. Kant accordingly proceeded to an examination of man's cognitive faculty, in order to discover the laws and extent of its operation. This investigation he designated the "Critique of the Pure Reason," and he maintained that the reason, as a pure faculty, must criticise not only itself, but also the subordinate faculties of sense and understanding. Kant understood by *pure* whatever is independent of experience, as opposed to the empirical, which rests upon it. The pure, or whatever in knowledge expresses the universal and necessary, is *a priori*, that is, antecedent to experience; whereas all that is contingent, or only comparatively general, is *a posteriori*. The first requisite in philosophy is a science which may establish a possibility, and determine the principles and extent of such knowledge, which must have its root in the pure reason itself, and cannot be the ground of the contingent and empirical; for the pure reason contains nothing except the formal or necessary principles of all knowledge, whereas the objects to which these principles refer are given to the mind from without. As an instance of these universal and necessary principles, Kant adduces the law of causation. The notion of a cause implies the necessity of its being connected with some effect, and enforces so strongly the universality of this law that it is inconsistent with the derivation of it from the repeated association of an effect with an antecedent. The next point which Kant notices, in the introduction to the "Critique of the Pure Reason," is the distinction to be drawn between analytical and synthetical judgments. The analytical are those in which the predicate is connected with the subject by identity; the synthetical are devoid of all identity of the subject and predicate. Analytical judgments may be also termed explanatory, the synthetical may be called extending judgments; since in the analytical the predicate adds nothing to the notion of the subject, and only resolves the notion which forms the subject into its constituent and subordinate notions, which are contained in it; whereas in the synthetical a new element is added by the predicate to those already contained in the subject, which was not previously understood in it, and therefore would not result from it by any analysis. For instance, the proposition that all bodies are extended is analytical; but the assertion that all bodies are heavy is synthetical. All the conclusions of experience are synthetical. Experience proves the possibility of the synthesis of the predicate "heavy" with the subject "body;" for these two notions, although neither is contained in the other, are nevertheless parts of a whole, or of experience, which is itself a synthetical combination of its intuitions, although they only bring to each other contingently. Now at last the reader can see the force of Kant's statement of his inquiry:—"How are synthetic judgments *a priori* possible?" Kant declares that they are possible, and strikes a middle path

between Descartes, Leibnitz, and Wolff (the great exponent of the high *priori* road in Kant's youth), and Hume and the sceptics. He agrees with the latter that all knowledge must start from a basis of experience, but to him experience is not mere sense-experience. Sensations, in Kant's meaning, are not experience, but the material of experience. There needs also a work of the understanding. As he puts it in the Prolegomena, "Experience consists (1) of the intuitions of sensibility (or sensation), and (2) of judgments which are entirely a work of the understanding." On the question of the perception of a material world, Kant taught that though we could, as the idealists truly say, only know phenomena and "not the things in themselves" which underlie those phenomena, yet we were not therefore to deny the existence of such 'things in themselves.' It is therefore grossly unfair to call Kant an idealist or an *a priori* philosopher; he was, in truth, an agnostic before agnosticism was born, a believer in a great something (matter) the true nature of which he held to be unknowable. But so also was he a positivist before positivism, for he is never weary of declaring that assertions without facts to back them are barren; he is the very apostle of experience. His great glory is that he has shown that neither agnosticism nor positivism is sufficient of itself, and that mere data can no more constitute true knowledge than mere speculation.

The closely corresponding distinction to this balance of experience and of pure reason which obtains in the soul between the promptings of sense and the call of duty, led Kant to his splendid conception and defence of the "categorical imperative" as the basis of the moral law, the subject of inquiry in his "Critique of the Practical Reason." Under the heading IMPERATIVE, CATEGORICAL, the dogma is fully given; but it may here be summarized as the feeling which Kant asserts to exist (and which, truly, most thoughtful men acknowledge does exist) independently of all reason, and very often, or perhaps most often, directly against the promptings of nature, that our duty is to act on each occasion so that our conduct might be held as an example for the universal action of mankind. "*I will*, not because *I wish to*, but because *I ought*." Upon this he bases a somewhat intricate argument for the freedom of the will.

True it is that philosophy is a veiled Isis after all; she is—

"What is, and no man understands,
And out of darkness come the hands
Which move through nature, moving men."

Yet of the little we can presume to try to know beyond external phenomena, Kant has contributed a very large proportion. His fame, modestly sufficient in his own day, has grown in ours to colossal proportions. He who is wearied with the dry bones of materialism and of agnosticism, he who is dazzled with the glitter of Hume's brilliant scepticism, turns to the sage of Königsberg with relief, if only he is patient enough to master his old-world phraseology. Many teachers have arisen and filled the world with their fame—Schelling, Fichte, Hegel, and in these latter days of despair Schopenhauer and Von Hartmann; they have arisen and they have for the greater part passed away. Kant alone looms higher, and ever higher as we pass further away from him. So is it with a mighty mountain whose full majesty is only seen from a distance great enough to dwarf to their true proportions the smaller peaks that to a nearer eye would seek to strive in rivalry with their monarch.

The year 1881 being the centenary of the appearance of the "Critique of the Pure Reason," this period brought forth a large quantity of very fine Kantian literature. Thus there appeared a masterly English translation of the great "Critique" by Professor Max Müller, with an historical introduction by Noë (London, 1881), which is even

better (and unhappily far more costly) than the excellent translation by Professor Meiklejohn in Bohn's collection. Professor Caird's "Philosophy of Kant" had appeared at Glasgow in 1877; Dr. Watson's "Kant" at Glasgow and Dr. Stirling's "Textbook to Kant" (a very fine comprehensive work, translation, criticism, &c.) at Edinburgh; both appeared in the centenary year, 1881. Dr. Wallace's interesting sketch of Kant (Blackwood's Classics) appeared at the same time as Dr. Stuckenborg's (of Ohio) exhaustive "Life of Kant" (London, 1882), which at once superseded all other personal accounts of the philosopher.

KA'OLIN or **CHINA CLAY**, a hydrous silicate of alumina containing about 14 per cent. of water, and having a specific gravity of 2.5, and hardness of about 2. Kaolin is a product of alteration, being mostly derived from the decomposition of the potash and soda feldspars in granite, which causes disintegration of the rock producing **GROWAN**, from some varieties of which good kaolin is obtained. Good kaolin is unctuous to the touch and somewhat plastic; it should not contain any gritty particles, and is of a milky white colour, except when containing impurity. Iron and lime are the most injurious foreign ingredients, as they act as a flux when the clay is baked. In Cornwall many of the granites produce good kaolin; they are often decomposed to a depth of 30 or 40 feet, and friable enough to be dug with a spade. This stuff is taken down by directing a stream of water over the loose material; this in suspension is conveyed through a series of strips or troughs, where the fragments of quartz, mica, &c., settle; the China clay, still in suspension, is allowed to settle in pits—the deposition of the fine kinds being accelerated by the addition of some alum in solution—from which it is subsequently excavated. The name kaolin appears to have been derived from a hill, *Kaoling* (high ridge), in China, where originally the Chinese produced China clay.

KAPEL'LE is in modern German use the synonym for orchestra, and *Kapellmeister* for conductor. Formerly it signified the private band of a great lord or prince, together with the solo singers and choristers attached to the establishment.

KARA'CHI or **KURRA'CHEE**, a seaport, and the chief town of the province of Sind, situated at the extreme northern end of the Indus delta, near the southern base of the Pabb Mountains in Baluchistan. The bay of Karachi is formed by the projecting headland of Manora Point, the extremity of a reef 10 miles in length, which supplies a natural barrier against the waters of the Arabian Sea. The opening of the bay between Manora and the opposite sanitarium of Clifton has a width of about $3\frac{1}{2}$ miles; but the mouth is blocked by a group of rocky islets, known as the "Oyster Rocks," as well as by the larger islands of Kimári, a little in the rear. The architecture of Karachi is essentially modern and Anglo-Indian. The principal church is the Anglican one of the Holy Trinity, situated in the cantonments. The Roman Catholic Church of St. Patrick is also situated in the cantonments. The European and Indo-European school, founded in 1854, under the auspices of Sir Baitle Frere, then Commissioner of Sind, occupies a handsome stone structure in the depot lines. The other chief modern institutions include the Presbyterian Church of St. Andrew, Christ's Church and mission schools, the Napier Barracks, Gosri Sanitarium, and post office. The government house is the residence of the Commissioner of Sind. Karachi may be regarded as almost a creation of British rule, its extensive commerce, splendid harbour works, and numerous flourishing institutions having all sprung up since the introduction of settled administration. Even before that time, however, the commerce of Karachi had attained to some importance, owing to the value of the river Indus as a channel of communication. But the sparse population of the country, combined with the short-sighted and selfish policy of its rulers, prevented it from reaching its proper

development. The chief exports are cotton, wool, indigo, seeds, hides, skins, oils, gingella, rape-seed, raw silk, shawls, and horses. A breakwater, 1508 feet in length, affords complete shelter to the western channel over the bar during the south-west monsoon, and combined with other works has led to the deepening at the entrance of the harbour to 20 feet at low-water spring tides. The rise and fall is about 8 feet. The climate of Karachi, owing to the prevalence of sea-breezes during eight months of the year, has a better reputation for healthiness than any other in Sind. The low situation of the town, and the near neighbourhood of marsh land, render the atmosphere both moist and warm; but the heat during the hottest months cannot compare with that experienced in the interior.

KAR'RAITES or **CARAITES** (Heb. *kara'im*, scrip-turist), a Jewish sect which took its rise at Bagdad about the middle of the eighth century. Its founder was a learned rabbi named Anan ben David, whose right of succession to the office of Resh Galutha was set aside because of his rejection of the authority of the Talmud. From Bagdad he moved with his followers to Jerusalem, where a synagogue was established, from which the doctrines of the sect spread with wonderful rapidity among the Jews of Europe and of Northern Africa. Very little can be ascertained as to the actual teachings of Anan, as notwithstanding the persistence of the sect his books have been lost. It seems, however, that although he rejected the rabbinical tradition and urged the study of the Old Testament scriptures apart from the interpretations of the rabbis, he propounded a series of interpretations of his own, which his successors enlarged and developed in much the same way as the earlier rabbis had done.

The Karaites appear in the earlier periods of their history to have been both numerous and influential, and to have produced an extensive literature, but at the present day the sect is small and insignificant. Its members are chiefly found in Southern Russia, Poland, Turkey, Egypt, and Palestine. They believe in an infinite Creator, accept the law of Moses and the other scriptures of the Old Testament as a divine revelation, believe in the necessity for prayer and fasting, in the resurrection from the dead, and in a final judgment in which every man shall be dealt with according to his works. They have a high reputation for morality, and are said to be of honest, industrious, and temperate habits.

KARIA. See **CARIA**.

KARL THE GREAT. See **CHARLES THE GREAT**.

KAR'LINGS or **CARLOVINGIANS**, **THE**, the second great royal house of France. The Merwings, once so fierce—when under Chlodwig (*Cloris*) they founded the Frank dominion in Gaul—had sunk almost into imbecility towards the close of the seventh century. The chief official of the empire was the mayor of the palace, and a succession of able mayors soon made this great charge and practical kingship hereditary. Pippin d'Heristal was mayor, in all, twenty-seven years, and ruled through four reigns; his natural son, Charles Martel (the Hammer, a kind of battle-mace he used), followed him; Pippin the Short was the third and last of the great mayors; and in 752, the imbecile Childeric having retired to a cloister, the Pope agreed that the race of the Merwings had ceased to reign, and Pippin was crowned King of the Franks by the Pope's orders by St. Boniface, the apostle of Germany. Pippin called himself a Karling, that is to say, the son of Karl, the termination *-ing* being equivalent in old Teutonic speech to "son;" and hence the new dynasty was called in Frankish speech that of the Karlings, or in Latin the Carolingians or Carlovingsians. It must never be forgotten that these Franks were Teutons, not Gauls, and spoke an antique German, not a modified Latin. The country of France and the French language and people were to grow up from these various elements in a future as yet far off.

Pippin the Short reigned from 752 to 768. Karl, his son, Charles the Great (or in French Charlemagne) followed him at first for a brief time in conjunction with his brother Carloman, but afterwards, from 770 onwards to his death, alone. His grandeur and power are told in the article CHARLES THE GREAT. The great Emperor (for Charles revived the Empire of the West in a new form, that of the Holy Roman Empire) died in 814, and the family of the Karlings began to show signs of exhaustion. Ludwig the Pious would have been in his place in a cloister, but on the throne the reins of empire floated loose in his feeble hands. He was repeatedly at war with his rebellious sons, and finally the great empire broke up. The French part, now really beginning to take on French as distinct from Frank characters, fell to Charles the Bald, son of the pious emperor; the other sons took other portions of the spoil. Charles in time became also emperor (875), but only two years before his death. His son Louis the Stammerer reigned only from 877 to 879, and his young sons Louis, Carloman, and Charles the Simple successively occupied the throne after their father's death, their German uncle Charles acting as regent. As with the Merwings so with the Karlings, from their decay sprang up a new race. These were the counts of Paris, who valiantly led their country against the terrible scourge of the Norse invasions, which now desolated the land and tore away altogether one of its fairest provinces, to give it the new name of Normandy. The counts of Paris became dukes of France, and for a century continued to imitate the policy of the early Karling mayors of the palace. Thus Duke Hugh the Great preferred to send to England for the young Karling prince Louis, at the death of the Burgundian usurper who followed Charles the Simple, rather than openly to take the crown himself. At Louis' death in 954, his son Lothair was permitted to reign, and Lothair's son Louis V. succeeded for a few months, from 966 to his death in 967. Duke Hugh the Cloaked (*capet*, because he was titular abbot of St. Martin les Tours), the son of Duke Hugh the Great, was then formally elected to the throne he had long really filled, and the long line of Capet sovereigns began. The Karlings had ruled as kings from 752 to 987.

KARNAK'. See THURRES.

KARNATIC (*Kannada; Kanara; Karnata; Karnataka-desa*, the Kanarese country), the name applied by modern writers to Dravida or the Tamil country, British India, that is, the country from Cape Comorin to the Northern Circars, lying east of the Ghats, and reaching to the sea on the Coromandel coast. Including Nellore, which is a Telugu-speaking district, it stretches from 8° 10' to 16° N. lat., and from 77° 19' to 80° 19' E. lon. The modern application of the name Karnatic includes the historic governments of Arcot, Madurai, and Tanjore. When the Mussulman kings of Golconda and Bijapur ousted the Vijayangara dynasty, they divided the country between them into Karnatic Hyderabad (or Golconda) and Karnatic Bijapur, both being subdivided into Payanghat and Balaghat. At this time, according to Wilkes, the northern boundary of Karnata (Karnatic) was the Tungabhadra. Speaking of this period and the modern misapplication of the name, Bishop Caldwell says: "When the Mohammedans arrived in Southern India, they found that part of it with which they first became acquainted—the country above the Ghats, including Mysore and part of Telingana—called the Karnataka country. In course of time, by a misapplication of terms, they applied the same name Karnatak, or Carnatic, to designate the country below the Ghats, as well as that which was above. The English have carried the misapplication a step further, and restricted the name to the country below the Ghats, which never had any right to it whatever. Hence the Mysore country, which is properly the true Karnatic, is no longer called by that name; and what is now geographically termed the Karnatic is exclu-

sively the country below the Ghats, on the Coromandel coast, including the whole of the Tamil country and the Telugu-speaking district of Nellore."

KARS is a city of Armenia, which, since 1878, has been included in the dominions of Russia. Situated among black basaltic hills 6000 feet above the sea-level, it has played an important part in the wars of Russia and Turkey; otherwise it is hardly worthy of notice, either on account of its commerce or architecture, though there are signs that under the Russian government the future may be brighter. Everywhere better buildings are springing up, and macadam roads are being constructed. A college has been founded, and several schools. The citadel, which was formerly considered a strong fortification, is now of little use against modern appliances. The town is 130 miles north-east of Erzeroum, and has a population of 12,000. Kars was taken by the Turks in 1853, and afterwards, in 1854, besieged by the Russians, who only succeeded in recapturing the place after a brave and memorable resistance on the part of the Turks, commanded by an English general named Sir William Williams, and General Knuty, a Hungarian. At the treaty of Paris, in 1856, Kars was evacuated by the Russians, and restored to the dominion of the Porte. In the war of 1877 the Russians, who had been compelled to raise the siege of the fortress early in July, carried it by assault on 18th November, and 300 guns and 10,000 prisoners were taken.

KASAN' or KAZAN, a province of European Russia, lies between 54° and 57° N. lat., and 46° and 52° E. lon., and is surrounded by Nijni-Novgorod, Simbirsk, Orenburg, and Viatka. The surface is an undulating level, with forests, rivers, savannahs, swamps, and marshes; the S.E. part of it is traversed by the western branches of the Ural Mountains. Area, 23,998 square miles; population, 1,900,000. The Volga flows eastward through the province nearly as far as the town of Kasan; it then turns south, and receiving the Kaama, its largest tributary, and several other feeders, pursues its course to the Caspian. The province contains many small lakes, which, as well as the rivers, are well stocked with fish. The climate is on the whole salubrious; but the winter is so severe that the rivers are covered with ice from November to the end of March. The soil is fertile. Hemp, fruit, and vegetables are grown for ordinary consumption. The forests contain good timber, and abound in bears, wolves, and game. Large herds and flocks are reared on the rich pasture-grounds which border the river. The Tartar inhabitants, who live in villages or in a separate quarter of the towns called *solbode*, collect a great deal of wax and honey. Stone for building, chalk, lime, alabaster, saltpetre, and small quantities of iron and copper are found. There are in the province numerous distilleries, saw-mills, potash works, tanneries, &c. The kingdom of Kasan included the governments of Kasan Proper, Perm, Penza, Viatka, and Simbirsk. It was annexed to Russia in 1552 by Ivan Vassilievitch IV., having been an independent Tartar khanate from 1441. Until its final conquest Kasan was the advanced guard of the Tartar hordes. These wandering tribes, which, profiting by division among the Russian princes, overcame and ravaged all Russia, weakened in their turn by division, fell back from the invaded territory, and only held their own on the Volga, from Kasan to Astrakhan, till they were utterly routed and brought under Russian sway by Ivan the Terrible.

KASAN, the capital of the above province, stands on a hill about 5 miles above the influx of the Casanka into the Volga, at a distance of 970 miles from St. Petersburg, and has a population of 80,000, of whom about one-fourth are Tartars. It is composed of the Krenlin, or citadel, the Middle Town, and the Lower Town; the whole encircled by gardens, fields, and meadows, which, when the Casanka is swollen by the waters of the Volga in the spring, are

subject, as well as the Lower Town, to inundations. The Kremlin contains the governor's palace, archiepiscopal residence, prisons, houses of correction, and the highly venerated "Karsianskaya Boyeniatser," or cathedral of the Holy Virgin of Kasan, the prototype of other Greek churches in various parts of Russia. The Middle Town has a fine bazaar, a beautiful market-place, and several well-built churches. The Lower Town, next to the Bulak, a feeder of the Casanka, contains the residence of the merchants, the university buildings, connected with which are valuable collections of coins, natural history, &c., a botanical garden, and a well-furnished observatory. Kasan has

numerous Greek and Tartar places of worship, a theological seminary, and a great number of schools. Cottons, morocco and other leather, soap, steel, iron, and earthenware, tiles, gunpowder, spirits, and beer are the chief manufactures. Kasan carries on an extensive trade by means of the Volga in these products, and it also has a good trade in furs imported from Siberia. Kasan was probably, under Tartar sway, a mere encampment, a city of tents; and there is hardly any evidence of its buildings belonging to a date anterior to the Russian conquest. The present Tartar houses are small, plain, uniform tenements, with three windows in front, surmounted by a triangular gable, all



Kasan.

facing the street, with narrow strips of garden on either side and behind, liberally open and visible to the passer-by. The windows have flowers and plants doing duty instead of curtains and blinds.

KASHGAR, an important town of Eastern Turkestan, formerly the capital of an independent kingdom, but now belonging to the Empire of China. It lies on the river Kashgar, and is the most westerly town of importance in the Chinese Empire. It is said to have been a great commercial town before the commencement of the Christian era, and is still the seat of a very considerable trade, and of manufactures in silk, porcelain, &c. The town is surrounded by walls, and its citadel is always strongly garrisoned. In 1865 the inhabitants succeeded in expelling the Chinese, who, however, repossessed themselves of the town in 1878. The population is estimated at about 50,000.

KASHMIR. See CASHMERE.

KASSAN'DER and **KASSAN'DRA**. See CASSANDER and CASSANDRA.

KASSIOPE'IA, **KASSITER'IDES**. See CASSIOPEIA, CASSITERIDES.

KAS'TOR and **POLYDEU'KES**. See CASTOR AND POLLUX.

KAT or **KHAT** (*Catha edulis*), a plant belonging to the order CELASTRINEÆ, and a native of Arabia. The leaves have been used by the Arabs from remote times to make a decoction with similar properties to those of tea and coffee. It is a shrub about 10 feet high, with very small white

flowers, and elliptic serrate leaves, 2 inches long. The sepals, petals, and stamens (in this genus) are respectively five in number: the petals are distinguished from those of *Celastrus* by not having any stalks. The ovary is three-celled, half immersed in the disk.

KATER, **HENRY**, an English mathematician of some eminence, was born at Bristol, 16th April 1777. He became a captain in the army, and for several years devoted himself to ascertaining the precise length of the seconds pendulum—an object of high importance in physical science. He was the first who availed himself of the convertibility of the points of suspension and oscillation for the determination of the exact length of a mathematical pendulum vibrating in the same time as a given pendulum. But his name will be transmitted to posterity in connection chiefly with his invention of the floating collimator, an instrument which has conferred on practical science essential benefits, its objects being the determination of the position of the line of collimation in the telescope attached to an astronomical circle. After a life spent in philosophical research, Kater died in London, 26th April, 1835.

KATH ODE, **KAT'ION** (or *Cathode*, *Cation*). See ELECTRO-CHEMISTRY, section *Electrolysis*.

KATRINE. See CATRINE.

KATTIMUNDOO, sometimes spelt *Cattimandoo*, is the juice of the plant *Euphorbia Cattimandoo*, extensively grown in India. This juice is procured by making incisions in the bark, or sometimes it exudes as a natural gum.

When solidified it resembles gutta-percha, and is used in India for similar purposes, but it has not yet become an article of export.

KAUFFMAN, ANGELICA, the painter (1740-1807), was born at Chur in Switzerland. Her full name was Maria Anna Angelica. She was taught painting by her father, who eventually took her to Rome. Thence she went to Venice, and was discovered by Lady Wentworth and brought to England. Her career was not wanting in romantic elements. To our juster appreciation her work seems affected and feeble, but in her own day Angelica Kauffman enjoyed great fame. Had she been more prudent in the management of her affairs, she might have realized a considerable fortune, for the patronage bestowed on her was most liberal. Her sex, and a certain charm of manner which was superior to mere beauty, lent her additional attraction. She was even sufficiently well thought of by her fellow-artists to be elected a member of the Royal Academy, and the well-known Bartolozzi was fond of etching her designs. She married Sir A. Zucchi, a Venetian artist, and accompanied him when he returned to his native country. She died at Rome.

KAULBACH, WILHELM VON (1805-74), a distinguished painter of the school of Munich, and pupil of the famous Cornelius, is renowned for his colossal paintings. The "Battle of the Huns," in the Berlin Museum, "Apollo and the Muses," at Munich, and the large wall-painting of "Homer in Greece," at Berlin, are his greatest works. His illustrations to Goethe, especially the series on "Faust" and that on "Reineke Fuchs," are considered among the best productions of their kind. To English ideas his style is hard, stiff, and dry; and his efforts to teach abstruse principles by painting not only fail to accomplish the object intended, as all attempts to make painting didactic must do, but seriously detract from his success as an artist.

KAURI or **KAWRIE GUM**, used in making varnish, is the dried, solidified sap of a kind of pine, *Agathis australis*, which grows only in New Zealand, in the province of Auckland. When the bark of the kauri pine is cut, even the oldest trees bleed like young saplings, and in a few weeks a large mass of half-dried gum will have oozed from the wound. This "young gum," as it is called, is white, and has not the rich amber colour of pieces which have lain for some time buried in the earth. The best kind and the largest quantity is obtained by digging for it in the ground, sometimes to a depth of several feet. The natives search for it with a long steel rod (the spear), with which they pierce the ground, and at once detect its presence. The gum is thus found in a semi-fossil state in various places where now no trees exist, such as bare hill-sides, swamps, and even under volcanic debris. Besides its use as varnish, it is sometimes used as jewelry, but it is not equal to amber. It ignites easily, and the natives employed it to light fires before the arrival of Europeans. When burning it gives off an aromatic odour like myrrh. The kauri forests are fast disappearing. See *AGATHIS*.

KAVA or **A'VA** is a plant belonging to the pepper family, *PIPERACEÆ*, and known to botanists as *Piper methysticum*. It is a native of the Polynesian Islands, and the creeping root, or rather underground stem, is used by the natives to prepare a narcotic and stimulating beverage. It is first chewed in the mouth, the liquid deposited in a bowl, strained through cocoa-nut fibre, and mixed with water. It is usually drunk without being fermented, and in that case is not intoxicating. Used to excess, it produces a white scurf on the skin, but this was formerly considered by the natives a mark of good birth, as the poorest were not able to purchase a sufficient quantity of the root to produce the effect. A tincture is useful in rheumatic complaints.

KEA (*Nestor notabilis*) or Mountain Parrot is remarkable as the only known carnivorous species of parrot. The kea inhabits the wooded glens and recesses of the mountainous districts of New Zealand. The general colour of the plumage is green. The body is 20 inches in length: the bill is about 2 inches long, with the upper mandible robust and strongly curved. It is nocturnal in its habits. The kea, like other parrots, was frugivorous in its diet till the introduction of domestic sheep into New Zealand. Now these birds have become abundant near the sheep-runs, and attack not only sick or disabled sheep, but even those which are strong and healthy. The kea seems not to shrink from wanton cruelty in the gratification of its appetite. It alights on the back of a sheep and drives its sharp claws into the wool, maintaining its hold despite all the struggles of its hapless victim. With its powerful beak the kea now cuts a way through the sheep's back, in some cases penetrating to the kidneys, and tearing away the fat surrounding those organs. The destruction of sheep is sometimes very serious. The keas that frequent the sheep stations live on the offal and sheep's heads thrown out to them from the slaughter-shed. This bird will at one time perch upon its food and tear off the flesh and devour it piecemeal like a hawk; at other times it will eat after the ordinary fashion of parrots, lifting its food in one foot to the mouth, and holding the rest down with the other foot. A specimen of this curious bird was obtained in 1881 for the gardens of the London Zoological Society.

KEAN, EDMUND, an English tragedian, was born in London, 4th November, 1787. His reputed father, Aaron Kean, was a stage carpenter, and his mother, Miss Ann Carey, was an actress at minor theatres and in showmen's booths. His theatrical education commenced early, and he made his first appearance on the stage at the age of four years, and as he grew older a friendly actress taught him all she could of the principles of acting. In his youth he was a strolling player, and once when he was performing with Richardson's troupe at Windsor, he was required to recite before George III. at the castle, which he did and so pleased the king that he dismissed him with a handsome present. In 1808 he married Miss Chambers, an actress, but during the next six years his life was marked by all the vicissitudes, struggles, and privations then incident to the profession of an actor in country theatres. In November, 1813, however, while acting at Dorchester, he was seen and appreciated by the manager of Drury Lane Theatre, and on the 26th January, 1814, he appeared at that theatre in the character of Shylock. His rendering of the part was received with tremendous applause, and his success served to save the theatre from bankruptcy as well as to enrich himself. He afterwards appeared as Richard III., Hamlet, Othello, Macbeth, and Lear, in all of which he gained immense fame and popularity. His career of success, including a visit to America in 1820, was uninterrupted till January, 1825, when he became involved in a scandal, which, after receiving judicial investigation, led to his separation from his wife and to his being driven from the boards both at London and Edinburgh. From this time his dissolute habits grew upon him until he became an habitual drunkard, and though he had been received upon the stage with something like his old popularity, his powers gradually failed until his performances became little more than a faint reflection of what they had been. His last appearance upon the stage was on 25th March, 1833, when he attempted at Covent Garden to play Othello to his son's Iago, but he broke down in the midst of the performance and had to be borne off the stage. He died at Richmond, 15th May, 1853.

Kean in his person was small but well formed; his face was thin but handsome; his eyes and hair were black; his countenance in variety and intensity of expression was wonderful. His voice in its upper tones was somewhat harsh, in its lower tones it was soft and melodious. His

conception of character was true and original, and the result of deep and careful study. For genuine comedy he had but little talent, but as a tragedian he stands among the first rank of actors. (See "Life of Edmund Kean," by F. W. Hawkins, two vols., 1869.)

KEAN, CHARLES, son of the preceding, was born at Waterford, Ireland, 18th January, 1811. He was educated at Eton, and when his father fell into ill health he adopted the stage as a profession, much against the wishes of the latter. He became popular in the provinces and paid a successful visit to America before he attained success in London; but in 1838 he played Hamlet at Drury Lane with such ability as to gain for himself a place among the tragedians of his time. In 1842 he married the actress Miss Ellen Tree, with whom he continued to act until his death. In 1850 he became lessee of the Princess Theatre, and acquired additional celebrity by the elaborate and tasteful production of the masterpieces of Shakspeare. He attempted the parts for which his father had been famous, but while his impersonations displayed evidence of high intelligence and painstaking industry they never reached the height of his father's performances. In melodrama his success was more complete, and of all his parts that sustained by him in the "Corsican Brothers" was perhaps the best suited to his talent. He died at London, 22nd January, 1868.

KEATS, JOHN, an English poet, was born in Moorfields, London, on the 29th October, 1795. He received a classical education at Enfield, under Mr. Clarke, the father of Charles Cowden Clarke, the celebrated Shaksperian scholar, and in 1810 was apprenticed to a surgeon at Edmonton. In 1815 he removed to London to walk the hospitals; and at London he made the acquaintance of Leigh Hunt, who formed a favourable impression of his abilities, and was mainly instrumental in introducing him to the public. In 1817 he published a volume of poems, which fell unnoticed from the press, though it contained the magnificent sonnet on Chapman's "Homer," one of the finest in the language. But it must be admitted it contained very little else of value. In 1818 he published his "Endymion," dedicated to the memory of Thomas Chatterton. This poem was severely criticised in the *Quarterly Review*, the bitterness of the attack being intensified on account of the poet's connection with Hunt, and it was the subject of a still more savage attack on the part of a writer in *Blackwood's Magazine*. It was the opinion of many of the friends of Keats, including Byron and Shelley, that the harshness and injustice of these reviews broke the spirit of the poet and hastened his death. The publication of the letters of Keats, however, has shown that, unhappy as these savage attacks had made him, there was no foundation for this impression of his want of manly fortitude. In 1819 Keats began to suffer from lung disease, and tried the mountain air of the Lake district and of Scotland in vain. Returning to London, much depressed, he had the sorrow of witnessing the death, through consumption, of his brother Tom. The same year he made the acquaintance of Miss Fanny Brawne, a lady of great personal attractions and talent, for whom he conceived a passionate attachment. The intensity of this passion, added to the pressure of pecuniary embarrassment, aggravated the symptoms of hereditary lung disease, and in the spring of 1820 he was taken so seriously ill that he believed himself to be dying. He rallied, however, during the summer, and at the close of the year he resolved to try the climate of Italy as a last resort—his friend Severn, the artist, accompanying him. They went first to Naples and then to Rome, where, after some months of severe suffering, Keats died, 23rd February, 1821. He was buried in the Protestant cemetery at Rome, at a short distance from the spot where the dust of Shelley was afterwards laid. The pathetic line placed at his own request upon his tombstone has caused

many a tear to start to the eye of those who realized the glorious promise and the less than half fulfilment—

"Here lies one whose name was writ in water!"

But though Keats did not live to see the beginning of his immortality—though the periclities of the first volume had been succeeded by the complete failure of "Endymion" to catch aught of notice save ridicule, the third volume of the poet had placed him at once in the very highest rank of English poets. Never was such a complete transformation from the chrysalis of ordinary versification to the butterfly magnificence of poetry replete with gorgeous effects. This world-famous third volume of poems appeared in 1820, and included "Hyperion," "Lamia," "Isabella," "The Eve of St. Agnes," and the odes to the "Nightingale," to "Autumn," and to the "Grecian Urn." With such literary splendours, sinning, if one dare use such a word, through the superfluity of beauty, Keats' fame has increased, and must increase. What lofty height he would have attained to had he been spared we cannot tell. As it is, dying at twenty-five, with all that wondrous wealth of beauty ready to be bestowed upon riper and maturer thought, his loss excites our intensest regret. "Greater lyrical poetry" (than the "Ode to the Nightingale," &c.) "the world may have seen than any that is in these," says Swinburne, his brother poet and generous rival in the quality of pure sensuous beauty of word and cadence, but, he adds, "lovelier it surely has never seen, nor can it possibly see."

The "Life, Letters, and Literary Remains of Keats" was published in 1848, in two volumes, by R. Monckton Milnes (Lord Houghton), and the "Letters of John Keats to Fanny Brawne," with an introduction by Harry Buxton Forman, appeared in 1878, to the general regret. They added nothing to his fame, and their publication was an unneeded yielding to public curiosity about a great man. Mr. Forman's edition of Keats' works, with notes, &c., in four vols. (London, 1883), has superseded all others for completeness and accuracy.

KEBLE, JOHN, M.A., an eminent English divine and poet, was born 25th April, 1792, at Fairford, Gloucestershire. He was the eldest son of the Rev. John Keble, vicar of Coln St. Aldwyn, near Fairford. After being carefully educated by his father, he was sent to Oxford in 1807. In 1810 he obtained double first-class honours, and in 1811 was elected fellow of Oriel. In 1815 he was ordained a deacon of the Church of England, and priest the year following, but remained at Oxford as public examiner and tutor until 1823, when he returned to Fairford to assist his father in pastoral work. In 1827 he published "The Christian Year," a collection of poems for the Sundays and holidays throughout the year, which was from the first received with immense favour by the religious world. In 1831 Keble was elected professor of poetry at Oxford as successor to Dean Milman, and he retained this office until 1841. The duration of Keble's professorship marks an eventful period in the history of Oxford and of the Church of England, for it covers the rise and early development of the "Tractarian controversy," the results of which are still far from being completed. Keble was one of the earliest workers in connection with this movement, with which he remained identified throughout the remainder of his life. In the excited state of political feeling which then prevailed the Established Church was regarded with great hostility by large masses of the population. It was also expected that its position would be materially affected by the changes introduced by Catholic emancipation and the passing of the Reform Bill. At the same time, within the church itself, there had arisen in the minds of many serious and thoughtful men a desire to see its spiritual influence extended, and a sense of dissatisfaction with the Erastianism that was then so prevalent. These feelings had been quickened by the influence of the

"Christian Year," and they found public utterance for the first time in the assize sermon, on the subject of "National Apostasy," preached in the university pulpit, 14th July, 1833, by Keble, which was afterwards published. "I have always," writes Newman in his "Apologia," "considered and kept that day as the start of the religious movement of 1833." Keble was the author of four of the celebrated "Tracts for the Times"—Nos. 4, 13, 40, and 89—and he saw and approved the famous tract No. 90, written by Dr. (now Cardinal) Newman, before its publication. In connection also with Dr. Pusey and Dr. Newman he edited the Library of the Fathers, the publication of which was commenced at Oxford in 1838. He had married in 1835 and settled at Hursley vicarage in Hampshire, of which he remained in charge till the end of his life. In 1839 he published "A Metrical Version of the Psalter," and in 1841 he gave to the world the results of his activity as professor of poetry at Oxford in two volumes, entitled "Prælectiones Academicæ." In 1846 he published his "Lyra Innocentium," and in 1863 his "Life of Bishop Wilson." He died at Beunmouth, 29th March, 1866, and was buried in his own churchyard at Hursley. In addition to the works mentioned, Keble was the author of numerous disquisitions on theology and ecclesiastical politics, and also of two volumes of sermons, and several works of a similar character have been compiled from his papers and published since his death.

It is, however, as a poet that Keble will be chiefly remembered, and few books have exercised the influence of his "Christian Year." The melody of its versification, the pure graces of its diction, and the union it displays of a true poetic fancy, allied with earnest and devotional feeling, have been recognised by religious people of all shades of theology. One hundred and fifty-eight editions were issued during the period covered by the copyright, and its circle of readers new waters with every year. A man of singular purity and nobleness, and one who lived daily at a high level of spiritual communion with God, Keble has in his poems expressed the highest and best of his aspirations and emotions, and it is perhaps this characteristic which has more than any other given them their wonderful charm and influence. At the same time many of these productions, when judged by a purely poetical standard, must be pronounced masterpieces of their kind, and such as will for ever be cherished among the treasures of the English language.

A memoir of Keble was published by his life-long friend Sir John Taylor Coleridge in 1868, and the Keble College, especially designed for a poor and clerical college, and the first founded at Oxford since 1711, was opened in 1870 as the best memorial that could be devised in memory of the author of the "Christian Year."

KEEL (Dutch *kelf*) is the lowest timber of a wooden vessel, upon which the whole fabric is raised. It extends longitudinally from one end to the other, and for a large ship consists of two or more pieces of timber scarfed together at the extremities, and is usually protected by strong iron binding. The ribs of the ship spring from it on each side, the stem and stern-post at each end; it is in fact the backbone of the whole structure, and carries the whole weight of the ship. The word anciently signified, in Old English, a complete ship, and we read of the sea-rovers invading England in *keels* or *keels*.

The *keelson* or *kelson* passes inside the vessel, from stem to stern, as the keel does outside, and is united to the latter by bolts which go through both, and through the floor timbers. In large ships two additional keelsons, about 30 feet long, are bolted to the floor timbers, sufficiently near to one another that the foot of the mainmast may rest upon them. They serve to relieve the bottom of the ship from the pressure of that mast, and strengthen it against the upward action of the water.

KEEL'ING (or **COCOS**) ISLANDS, or the Cocoa-nut Islands, as the latter name implies, are a remarkable group of coral islands of the atoll type in the Indian Ocean, in lat. 12° 5' S. and lon. 90° 55' E. There are twenty-three islands in all, of which the chief are Horseburgh or North Island, Direction Island, Prison Island, Rice or Water Island, South Island, and Long, West, or Ross Island. The water separating the various islands is often very shallow. The climate is temperate. The area of the group is about 127 square miles. Keeling Islands were first discovered in 1609. They are now under British protection, and included under the government of Ceylon.

KEEPS, in the feudal ages, were strong towers in the middle of any fortification, to which the besieged resorted in the last extremity. They were similar to what the classical ancients called the citadel, or inner fort, a term which is still applied to modern fortification. See **CASTLE**.

KEHL, a town of Baden, on the Rhine, immediately opposite Strassburg, having a population of 1600. It was repeatedly taken by the French, and fortified by Vauban; but its works were demolished after the peace of 1815—Germersheim being fortified by the Germanic Confederation in its stead. The town is connected by a fine railway and passenger bridge with Strassburg. This bridge was built in three parts—the central one being fixed, whilst that at each end was movable, and communication could thus be broken off suddenly without permanently injuring the bridge. At the commencement of the war between France and Germany in 1870, the Germans were not, however, satisfied with this protection, but blew up their portion of the structure entirely. The town was afterwards almost destroyed by shells from Strassburg, during the siege of that city by the Germans.

KEIGHLEY or **KEITHLEY**, a municipal borough and market-town of England, in the county of York, and 30 miles W.S.W. from York, stands in a deep valley at the junction of two streams, which fall into the Aire about a mile to the N.E., where also the Leeds and Liverpool Canal passes. It has a station on the Midland Railway, by which it is 218 miles from London. The town, which has become a populous and very prosperous place, is irregularly built, mostly of stone, and contains good commercial buildings, a court-house, an ancient church, rebuilt in 1878, and a fine Gothic mechanics' institute and school of art. Woolen and worsted manufactures were early introduced here. The first cotton mill was erected in 1780. There are a large number of cotton and worsted mills in and about the town. Haworth, the home of Charlotte Brontë, the author of "Jane Eyre," who with most of her family lies buried in its churchyard, is one mile distant. Graphic sketches of this neighbourhood will be found in Charlotte Brontë's works, and also in Mrs. Gaskell's "Life" of that novelist. The population of Keighley in 1881 was 25,245. Keighley is known in the history of the Civil War as having been the scene of an encounter, in 1645, between the king's troops and a division of the parliamentary army under Colonel Lambert. Its name is derived from an old family called Keighley. The town was incorporated in 1883.

KEISER, REINHARD (1673-1739), would be interesting to an Englishman, if from no other reason, by the fact that his fame as a composer and director of opera attracted Handel as a youth, so that he enrolled himself as a violinist in Keiser's band, and stayed there for three years diligently studying him as the best model then available, and at length writing for him four operas of his own, and officiating as assistant director and accompanist at the harpsichord. This composer, whose reputation was so great and so well founded, as Handel's conduct shows it to have been, has suffered unduly by the greater merits of his successors. In truth Keiser was the practical creator of German opera, though Schutz technically has a prior claim. His father was a good writer of church music at Leipzig,

and grounded Reinhard well in all the then known subtleties of the art. Reinhard Keiser came as a young man of twenty-one to Hamburg, and made a sensation altogether extraordinary by the way in which he handled the theatre orchestra; and here he stayed forty years, during which time he produced no less than 116 operas, besides a large quantity of other music, especially some very fine oratorios. In the year 1709 he turned out eight complete operas, so great was his facility. His extravagance, however, kept him continually in difficulty; and like most opera managers he found his failures outbalance his great successes. The characteristic of Keiser's work, a little of which is still occasionally heard, is a fine vein of genuine melodic power, which explains the secret of his great success in opera and of his attraction for the young and ardent Handel.

KEITH. The family of Keith is one of the most ancient and historical in Scotland. The office of the king's marischal was attached to the lands of Keith in East Lothian; and in 1305 Sir Robert of Keith, hereditary marischal of Scotland, was justiciary of Scotland from the Forth to the Mounth, and sat in the English council at Westminster as a Scotch representative. He commanded the Scotch cavalry at Bannockburn, and afterwards married a relative of Bruce. Through this alliance the Keiths acquired large estates in Kincardineshire, and, by purchase, the sea-girt rock of Dunnottar, where they built a castle, which they made their chief seat. The family was ennobled about 1458, and the fourth earl nearly doubled his domains by marriage with the heiress of Inverurie, and was reputed the wealthiest peer in Scotland. These vast possessions passed to George, the fifth earl marischal, and founder of Marischal College, Aberdeen, who succeeded his grandfather in 1581. His memory has been perpetuated mainly by his enlightened munificence displayed in the establishment of the above college.

KEITH, GEORGE, tenth Earl Marischal, eldest son of the ninth earl, was born about 1693, and succeeded his father in 1712. He was attainted for his share in the rebellion of 1715, and with his brother escaped to the Continent. After many hardships and long wanderings, he found refuge at the court of Prussia, and was appointed by Frederick the Great ambassador to the court of France, and afterwards to Madrid. While at the latter court he revealed to Mr. Pitt an important secret respecting the family compact of the princes of the house of Bourbon. This procured his pardon in 1759, and he revisited Scotland, but in a few years returned to Prussia, where he died in 1778, in the eighty-sixth year of his age. The title became extinct at his death. His brother James, who had risen to the rank of field-marshal in the Prussian service, closed a brilliant military career at the battle of Hochkirchen, fought between the Prussians and Austrians on the 14th October, 1758. King Frederick celebrated the virtues of his friend in a poetical epistle.

KEITH, a market-town and parish of Scotland, in the county of Banff, situated on both sides of the Isla, a tributary of the Deveron, that portion which is on the right bank being formerly divided into the Old and New Keith, but now known as New Keith only; that on the left bank is known as Keith-Fife. They are connected by two bridges, the oldest of which is used only by pedestrians. The town is nearly a mile from the station, and is 20 miles W.S.W. of Banff, on the Great North of Scotland Railway, and 596 miles from London. It is surrounded by hills, and is for the most part built on a regular plan. It has a public hall, erected in 1873, an hospital, built in 1880, a parish church, a Free church, a United Presbyterian church, an Episcopal church in the Gothic style, and a Roman Catholic church—all of which have been erected within the present century. The last has a fine altar-piece, presented by Charles XII. of France. Tweed and blanket manufactories, a distillery, a brewery, manure works, and

an agricultural implement manufactory supply employment to the inhabitants. The famous "Summer Eve Fair" is still held, but is now comparatively unimportant. The population of the parish, of which a small portion is in the county of Elgin, was 6396 in 1881; of the town, 1196.

There appears to be evidence that the town existed as early as the twelfth century as "Geth." In 1645 Montrose appeared before Keith for the king, but withdrew without fighting; five years later he passed through as a prisoner. In 1745 a skirmish took place between the forces of the Pretender and those in the royal service, in which the former had the advantage, and carried off 150 prisoners. James Ferguson, the celebrated natural philosopher and self-taught astronomer, was born near Keith; the only school he ever attended was one in the town, and that only for three months. His "Autobiography" is well known.

KEKROPS. See CECROPS.

KELLOWAY ROCK is the name applied to an impure calcareous sandstone forming one of the members of the Oxford Oolite. At Filey Bay in Yorkshire it is about 30 feet thick; it extends into Lincolnshire and reappears in Wiltshire; but in the Midland counties it does not exist as a separate formation. It is abundantly fossiliferous, being specially rich in ammonites of such species as *Ammonites calloviensis*, *gowerianus*, *modiolaris*, &c. *Ancyloceras* also occurs, *Bellemnites oweni*, and the lamellibranchs *Avicula inaequalis*, *Gryphaa bilobata*, besides many other forms; of vertebrates, fishes such as *Hybodus*, *Lepidotus*, *Pycnodus*, and reptiles of the saurian kind, such as *Icthyosaurus*, *Megalosaurus*, *Plesiosaurus*, &c.

KELLS, a very ancient market-town of Ireland, capital of the county of Meath, situated 10 miles N.W. from Navan, near the south bank of the Blackwater, and on the Kells extension of the Navan branch railway, 36 miles N.W. from Dublin. It contains a sessions-house, a handsome Roman Catholic chapel, an ancient church with a round tower 99 feet in height and cross in the churchyard, and an ancient stone cross, at one time used as a part of the gallows, richly carved, in the centre of the town. There are also a union workhouse, fever hospital, market-house, two banks, and some manufactures of lace. The principal proprietor is the Marquis of Headfort, whose seat is in the immediate neighbourhood. There is something very imposing about the entrance to Kells—the spacious and well-wooded avenues, the wide streets, adorned with old trees, and terminated by the venerable church and handsome Roman Catholic chapel. At the weekly markets considerable quantities of produce are disposed of. The population in 1881 was 2820. Kells, anciently called *Cuanamus*, and later *Kenlis*, the "head fort," is a very old town, a synod having been held here in 1152, and a castle erected on the site of the market-place in 1178. Here, also, was a monastery, some remains of which still exist, and are called St. Columbkille's House, from the name of its reputed founder.

KELP, the fused ash obtained by the incineration of certain of the commoner forms of seaweed. It is produced on the wild shores of the Hebrides and the west of Ireland, and on the coast of Brittany. There are two well-marked varieties, called drift-weed kelp and cut-weed kelp. The former is made from the seaweed thrown up by the storms on the coast, and is mostly derived from *Laminaria digitata* or *Laminaria stenophylla*, known as "tangle" and "bardarrie." The latter is obtained from seaweed cut in the lochs or on the shores, and consists of *Fucus vesiculosus*, *Fucus nodosus*, and *Fucus serratus*, generally known as "beach wrack." In either case the seaweed is dried on the shore and burnt in rough kilns, built of stones, until the ash runs into a kind of slag. At one time this substance was the principal source of carbonate of soda, and formed a trade of considerable importance, especially in the Highlands. At the beginning of this century it realized £20 to £22 per ton, and the Hebrides alone produced 20,000 tons per annum; and as

the cost of production did not exceed £2 per ton, it added considerably to the wealth of the Highland lairds. Soon after this period the importation of barilla commenced, and for the twenty-two years ending 1822 the average price had fallen to £10 10s. per ton. The duty was then taken off barilla, and the price of kelp fell to £8 10s. In 1823, on the removal of the salt duty, it fell to £3, and in 1831 to £2 per ton. Carbonate of soda was now being largely made by the Le Blanc process from salt or chloride of sodium, and the alkali works became formidable competitors, and soon superseded kelp altogether as a source of soda. Up to 1845, however, it was still used to a small extent in the soap and glass factories of Glasgow. As, however, it seldom contained more than 4 per cent. of soda, and often less than 1 per cent., it must always have been a very expensive source of that important alkali. About 1840, however, the manufacture of iodine, bromine, and potash salts was commenced from this source, and in consequence of the high price of potash was for some years very remunerative. About twenty years after this, however, the industry received another blow in the discovery of potash and bromine in the German Stassfurth mineral, which speedily reduced the price of potash to a third, and that of bromine to a tenth, of the former value. More recently the manufacture of iodine from the caliche of Peru has also reduced the price of iodine, and kelp is again an unproductive and languishing industry. In former years, when kelp was employed as a source of soda, the cut-weed variety, burnt at a high temperature, was that required; for the manufacture of iodine, however, this is of little value; the drift-weed alone is now used, and it should be burnt at as low a temperature as possible. Unfortunately the kelp burners stick to their old ways, and as a result half of the iodine is generally volatilized, and the kelp is a crude product of little value; it is also largely adulterated with sand and stones, which are easily incorporated with it when in the fused state.

In 1863 a new method of burning the seaweed was introduced by Stanford, which has been in successful operation since that time in works built in the islands of Tyree and North Uist. The seaweed is carbonized in close retorts, and converted into charcoal, which retains the whole of the iodine and salts. The other products are tar, gas-liquor, from which ammonia is recovered, and gas used to light the works. This method requires expensive works at each place. But more recently another process, of more general application, has been patented by the same chemist. In this process all the commoner varieties of seaweed can be used. The plants, air-dried, are treated with carbonate of soda in solution, which leaves only the cellulose undissolved; the solution is precipitated by sulphuric acid, when a new substance, called algin, is thrown down and filtered off; the solution being evaporated to dryness and carbonized forms the kelp substitute, and contains all the iodine originally present in the weed. The cellulose can be used in paper-making. The insoluble algin or alginic acid is very like horn, and forms a good substitute for it. When dissolved in soda, it forms soluble algin or alginate of soda, which is an extremely glutinous substance and much resembles albumen, and can be substituted for it in sizing fabrics, or as a mordant in calico printing. Kelp is at present a small article of commerce, but it represents in seaweed a raw material of enormous extent, and which is at present almost entirely unutilized.

KELSO, a burgh of barony of Scotland, in the county of Roxburgh, 11 miles north by east from Jedburgh, on the north bank of the Tweed, which receives the Teviot, just opposite the town. It consists of several streets converging on an open square, and extending along the Tweed. The old houses, with gables to the street, have very generally given way to more modern buildings of freestone, roofed with slate, giving to the place a very handsome appearance.

The situation is strikingly picturesque, the environs beautiful, and the town itself one of the best in Scotland of its size. There is a handsome town-house, a corn exchange, a parish church, said to be remarkable for its ugliness, a *quoad sacra* Established church, which for some years belonged to the Free Church, two Free churches, two United Presbyterian churches, a Baptist chapel, and a Roman Catholic church, numerous schools considering the size of the town, a valuable library, a museum, and the usual commercial establishments. The town has also a fine public park of 8 acres. Among many institutions and societies may be noted the Border Union Agricultural Society, and the Horticultural Society, the shows promoted by both of which have attained more than local celebrity. The racecourse is considered one of the finest in Scotland. The chief industries are the manufactures of tweeds, plaidings, and blankets, coach-building, cabinet work, upholstery, fishing-tackle manufacture, agricultural machinery making, and iron-founding, but the town derives its chief commercial activity from its retail trade. The bridge over the Tweed is the first in which the elliptic arch was employed. It is 494 feet long, and its five arches have each a span of 72 feet. The population of the parish in 1881 was 5235; of the burgh, 4687. The famous Abbey Church was founded in 1128 by David I. for Tironensian monks, and endowed with immense possessions and privileges. Its form is that of a Latin cross, and it affords a fine specimen of the Saxon or Early Norman style of architecture. Its ruinous state is owing to its having been occupied as a place of security by the townspeople in 1545, and in consequence having been battered down by the English under the Earl of Hertford. The parts now remaining are the north and south aisles, each having two round towers, with two sides of the central tower, now only 91 feet high. The thickness of the lower walls is 5½ feet. The pillars are clustered; the arches circular. Part of the ruin served as the parish church from 1649 till 1771, when it was deserted, from the idea of insecurity, for another place of worship. Kelso was the first provincial town in Scotland that introduced the printing-press. The first edition of Scott's "Minstrelsy of the Scottish Border" was printed in Kelso by James Ballantyne, who afterwards brought the typographical art to high perfection in Edinburgh, where he carried on the printing business in partnership with Scott.

Kelso, anciently known as *Calkou* or *Calchou*, was originally a kind of suburb to the burgh of Roxburgh, on the opposite bank of the Tweed. But the foundation of the abbey gave it a more important character; and on the final destruction of Roxburgh, in the fifteenth century, its inhabitants transferred themselves thither. No traces now remain of the burgh of Roxburgh, and but few of its castle, though the latter was for centuries one of the most important Border fortresses. In 1460, James II., having taken the town of Roxburgh and demolished it, laid siege to the castle, during which he was killed by the bursting of a cannon. The queen, attended by her infant son James III., encouraged the besiegers, and in a few days the fortress was compelled to surrender. It was then destroyed; since which time it has remained in ruins, though partially repaired by the English, under Somerset, in 1547. Soon after the Reformation, the lands and possessions of the abbey were conferred on the ancient abbey of Kerr of Cessford, in the hands of whose descendants, the family of Roxburgh, they still remain. Kelso has repeatedly suffered from conflagrations and floods, not in the warlike times merely, but in pacific, as in 1686 and 1788.

KELTS, and **KELTIC LANGUAGES AND LITERATURE**. The Kelts are an ancient stock of the great Aryan family of nations. The ignorant confusion of the Roman alphabet between K and C, as shown in the article on those letters, has caused the Keltic (*Keltai* or *Keltai*) to figure as *Celtic* in Latin, and hence,

through our English rendering of the Latin, as *Celts* in our own tongue. The corresponding error in speech, namely, the absurd alteration of the hard Latin *c* into the *s*-sound usual with ourselves before *e*, was not possible to the Romans. To avoid miscalling these people *Selts*, therefore, a return to the original Greek spelling has become imperatively necessary, and is now practically universal. The point is by no means a trivial one, as at first sight it might appear; for the Greeks give the Kelts three names, and use them indiscriminately; these names are *Κελτοί* (or *Κελται*), *Γαλάται*, and *Τάλλοι*, and the Latins Latinize these into *Celtæ*, *Galatæ*, and *Galli*. Now it is quite evident from the Greek, what is not at all evident from the Latin (if *Seltæ* be the pronunciation adopted), that these names are mere variations, and scholars have been led from this to seek for and ultimately to leave little doubt of the identity of race of the Kelts, the Galatians, and the Gauls. In the article *GAUL*, this point is carefully worked out, and the curious history of the great Gaulish or Keltic invasion of Europe and of Asia Minor traced from the dim records yet remaining. The earliest wave of this Keltic invasion was the people we now call *Gaelic*, this term being a modern Scotch corruption of *Goidil* or *Gaedhil*; and here we probably have the original form, or something like the original form, which the Greeks at various times imitated with their *Keltai* and *Galatai*. It is further suggested, and the idea is luminous, that the original of *Kelt* yet exists in German in the softened form of *Held*, warrior-hero; and this would correspond well with what we know of the similarly derived names of many other nations. On this showing Kelts would signify the "Warrior-Nation," a finely conceived, dignified, and appropriate title.

The Keltic people, from their home in Central Asia, dashed upon Europe in many waves. [See *GAUL*.] They drove before them the dark-eyed, small-statured, round-headed people whom they found in the land, and who yet exist probably as Basques, &c. They themselves were fair-haired, possibly reddish-haired, blue-eyed or gray-eyed, long-headed, tall and muscular. After the first Gaelic Kelts had settled in the west of Europe, as Gauls or Gauls, &c., a fresh wave of kindred folk, still fiercer warriors, called *Cymry* and in Gaul *Belgæ*, fell upon them from the east, and drove them in all directions, north, west, and south. The Gauls of the Continent were driven into Spain (Keltiberi or Celtiberi), into the north of Italy, into the north of Greece, and into Asia Minor, by the pressure at their back of the powerful Cymric Belgæ, who occupied Northern Gaul all along the coasts and into Brittany. The Cymry in Britain drove the Gauls before them into Ireland and Scotland, and themselves occupied what is now England and the Lowlands of Scotland. These all-conquering Cymry fell before the Roman dominion, and became, as "ancient Britons," partly civilized; losing their ancient fierceness they eventually fell an easy prey to the English invaders from the coasts of the North Sea and the shores of the Elbe, and but a scanty remnant exists in Cumberland, Wales, and West Wales (i.e. Cornwall)—of which only the Welsh portion now retains its original tongue. Meanwhile the Gauls, untouched by the enervating yoke of Rome, preserved their fierceness of manners. They are the Picts and Scots, so terrible in our early annals; and to this day they speak their primitive speech in the two great dialects of Gaelic (Scotch) and Erse (Irish).

The differences of language between the two great branches of the Kelts are considerable enough to make us feel that a very long period must have elapsed before the Cymric wave broke in upon its Gaelic predecessor. Fundamentally the same, they have diverged somewhat widely in particulars, and knowing how slowly such divergences arise this discrepancy points (like unconformity of strata

with the geologist) to a great interval of time and a great separation by distance between the two branches. For instance, comparing Erse with Welsh (as representatives respectively of Gaelic-Keltic and Cymric-Keltic) we find the evidently more ancient hard *k*-sound retained in Erse and lost in Welsh, where *p* replaces it—*kethir* (or *ceithir*), the Erse for "four," becomes *pedwar* in Welsh. (It is curious to compare the Latin version of the word *quatuor* with the first of these other two ancient variations, and the Greek *tessares*, or in the dual-form *piuores*, with the second. It is from the Greek-Welsh side we get our old *fourer* and modern *four*, and from the Latin-Erse side that we get our word *quarter*; and yet at the out-set few would suppose that "four" and "quarter" were the same word in origin.) Another difference is the softening of the old heavy *b*-sound into *p*; thus the Irish and Scotch mountains are *Bens*, while the Welsh are *Pens* (Cumbria and Cornwall yield many *pens* also, as Penrith, Penrhyn, &c.) So also the sign of sonship, the Irish and Scotch *mac*, or probably *macch*, with a final guttural sound, becomes the light labial sound *map* in Welsh, and later on the initial *m* is dropped. MacDermot and Macbeth are the exact correlatives of Ap-Jenkyn. The antique roots are kept in Erse (as *tech*, house) which are lost in Welsh (*ti*, house); and the declension of the noun and other interesting particulars yet existing in the older Gaelic branch have altogether died out in the younger Cymric.

The continental Br-ton tongue is very closely akin to the now extinct Cornish form of the British (Cymric) speech; and according to inquirers into the ancient speech of the Belgæ of Belgium and Northern France they also should be linked with this dialect, thus powerfully corroborating the view of the second inburst of Kelts in the form of the Cymric branch, driving the Goidilic or Gaelic branch in all directions before it.

There is a remarkably fine body of Keltic literature. The very numerous Erse writings have been happily preserved to us by the late survival of the tribal system, each tribe having its clan of bards who perpetuated the ancient legends and myths in the form of history. An attempt at eliminating the historical element from this literature is made in the historical section of the article *IRELAND*. [See also *IRISH LITERATURE*.] The rest of the Erse literature is made up of valuable scraps of glosses or translations, accounts of ancient Keltic laws (Brehon laws), epic poems, and religious works; but unfortunately the accounts of the great Keltic religion of the Druids are very meagre. The accounts of Druidism found in the Welsh literature are later inventions and quite untrustworthy.

The Scotch-Gaelic contributions to this literature are not Pietish, but Erse in a modified form. This is due to the ancient Irish or Scots having become a literary people on their conversion to Christianity, and having carried the love of letters with them on their missionary expeditions to Scotland; the Scots of Ireland thus gave their name to the land of the Picts—Alba, or Caledonia, as it had been called; and while Caledonia now took the ancient name of Ireland—Scotia—Ireland itself came to be called *Ierne* or *Erin*. Not a trace of pure Pietish survives, but the Erse of Scotia, used as it was by Picts as their literary language, came to have a Pietish flavour, and it is this modified Pietish variety of Erse which we call Gaelic. For a long time Irish bards and poets with their copious literature held sway in Scotland also; but when, in the fifteenth century, the Irish bards began to decline, a race of Gaelic poets sprang up, and the Gaelic dialect rose to literary importance. Mr. James Macpherson collected some scraps of this poetry in the last century, and they were so much admired that he wove a larger collection, which on the strength of his success he had proceeded to make, into a considerable series of poems, which he called the poems of Ossian, and published as a translation. There

was more of Macpherson than of Ossian in it, and on his publication of the painfully made up Gaelic "original" the patchwork was easily detected. [See OSSIAN.] Had Macpherson been a true student we might have known more about Gaelic literature than we now do; unhappily, when the opportunity existed for yet preserving it, the man was not there to seize it.

The third collection of Keltic literature is older in most part than the few scraps we have of Gaelic, but cannot approach the antiquity of the earliest Erse remains. The most remarkable point about this Welsh literature is the unique style of composition, called the *triad*. There is a considerable collection of Welsh triads, and the rule pervading them seems to be a grouping, for the sake of better remembrance in a sort of proverbial fashion, three things connected by some common attribute; as "three ornaments of a village—a book, a well-trained singer, a blacksmith in his forge." Such dim glimpses of ancient British history as we possess are largely preserved in this form; the triads of Arthur and his knights are perhaps as old as the thirteenth century. The poetic literature of the Welsh is very extensive. Much of it is attributed to poets such as Taliessin (the Splendid Forehead) and Merlin, who are alleged to have lived in the fifth century; but it is now generally admitted that whatever the age of the poems originally, they are in their present form not earlier than the twelfth century. While, therefore, there are a few mythological poems, the vast mass is undoubtedly Christian, and is due, no doubt, to early monks. Much would appear from inherent evidence to have been of the tenth century or earlier, handed down by tradition and committed to writing in the twelfth and thirteenth centuries. There is a considerable body of twelfth-century poetry whose authors are known to us, and among it the poems of Gwalchmai are especially noteworthy for a very fine appreciation of the beauties of nature. A very famous, and deservedly famous, collection of Welsh mediæval tales in prose was made by Lady Charlotte Guest in 1849, and published in three volumes under the title of the "*Mabinogion*," though the title of *Mabinogi* strictly is limited to four of these tales. They form a cycle of legends, full of the ancient Keltic mythology, and mixed with later myths of Arthur, king of Britain. Besides these there are a number of old chronicles or "Bruts," a few lives of British Christian saints, some grammatical books, and some old books on music which still await a competent elucidation. The influence of the Keltic literature has been considerable upon English poets, as Chaucer, Spenser, Shakspeare, who adopted its legends and its vague and beautiful fancies as they reached them from intermediary sources, and worked upon them till they grew into the masterpieces of our tongue. Even in our own day our greatest poet, in his "*Idylls of the King*," has spent his best years upon these ancient themes. Thus though in itself our British forefathers have bequeathed to us no work of monumental excellence, they have been the cause of inspirations of imperishable beauty.

KEMBLE, CHARLES, a member of an illustrious family of actors, being brother of John Philip Kemble and of Mrs. Siddons, was born at Brecknock, on the 25th November, 1775. He was educated at the Roman Catholic College of Douay. In 1792 he obtained a situation in the post office; but so strong was his predilection for the stage, that he soon threw up his employment; and after a few appearances at private theatres, made his debut in public at Sheffield, as Orlando in "*As You Like it*." In 1794 he was engaged at Drury Lane, and in 1797 at the Haymarket.

Charles Kemble played successfully for a lengthened period the widest range of characters of any actor of the age. His Macduff, Aulidius, Cassio, Laertes, Alcibiades, Henry V., Antony, and Orates were true personifications of historic character, as represented by a majestic form,

an impressive countenance, and a full-toned commanding voice. He also engaged in dramatic authorship. For a short period he was the manager of Covent Garden Theatre, and in 1882 visited America with his daughter Fanny. In 1840 he accepted the office of examiner of plays, having closed his career as an actor in the April of the same year. He died on the 12th November, 1854.

Two daughters of Charles Kemble attained distinction. FRANCES ANNE KEMBLE, known as Fanny Kemble, and later as Mrs. Butler, was born in 1809, and made her first appearance on the stage as Juliet in 1829 under her father's management. She became very popular as an actress. In 1832 she accompanied her father to America, and married Mr. Butler in 1835. She was divorced from him in 1839. She is best known to the present generation by her poems, her "*Residence on a Georgian Plantation*" (1863), and other books. While on the stage she played in a tragedy of her own, "*Francis I.*," which had considerable success at the time, but which did not stimulate her to further dramatic exertions. Her sister, ADELAIDE KEMBLE, born in 1816, was singularly gifted as a singer, and won much favour first at Venice and then elsewhere on the Continent. Recalled to England by a severe illness of her father, she appeared upon the London opera stage in her favourite part of Norma, and at once achieved a most brilliant success. Unhappily for art, though possibly far happier for herself, this great artist retired after two short years, on becoming the wife of Mr. Frederick Sartoris. Mrs. Sartoris published some charming books and essays. She died 6th August, 1869.

KEMBLE, JOHN MITCHELL, an eminent Anglo-Saxon (Old English) scholar, son of Charles Kemble noticed above, was born in London in 1807. He was educated at Cambridge, where he took his B.A. in 1830. While an undergraduate he travelled in Germany, where he married the daughter of a German professor and enjoyed the friendship of the brothers Grimm, of Ast and Thiersch. After taking his degree he commenced a series of researches in Old English literature and history, and in 1833 he published the poem of "*BEOWULF*," with a preface, glossary, and translation. In the years 1839–41 he published his important "*Codex Diplomaticus Ævi Saxonici*," many of the charters printed in which had been discovered by himself. His most important work, however, was the valuable "*History of the Saxons in England*," two volumes of which were issued in 1849, but which was never completed. He was making preparations for the issue of two more volumes when his career was closed by death at Dublin, 26th March, 1857.

KEMBLE, JOHN PHILIP, elder brother of Charles, was born 1st February, 1757, at Prescott, in Lancashire. His father, Mr. Roger Kemble, was an actor and manager of a provincial theatrical company. He was educated partly at the Roman Catholic seminary of Sedgley Park, in Staffordshire, and afterwards at the English college at Douay, in France, whence at the age of nineteen he returned to England, and made his appearance in the character of Theodosius, in the tragedy of that name, at Wolverhampton, 8th January, 1776. Two years afterwards he was a regular member of the York company. On Tuesday, 30th of September, 1783, Kemble made his first appearance in London at Drury Lane, in Hamlet. In 1790 he became manager of that theatre. In 1803 he purchased for £24,000 a sixth share in the Covent Garden Theatre from Mr. Lewis, and became manager of that establishment. In 1808 Covent Garden was destroyed by fire; and on the opening of the new theatre in 1809, under Kemble's management, an advance in the prices of admission to the pit and boxes gave rise to the well-known O. P. (Old Prices) riots, during which the tragedian was personally and grossly insulted whenever he appeared upon the stage. On 23rd June, 1817, he took his leave of the London

audience, and soon afterwards retired to the south of France, finally taking up his residence at Lausanne, in Switzerland, where he died, 26th February, 1823, aged sixty-six. Kemble's talents, both as an actor and a manager, were of a very high order, his fine taste and classical acquirements being perceptible in every effort. He is by common consent considered among the greatest of English tragic actors, and probably more would be found to give him the very highest place than those who would unite in favour of any other modern tragedian. In society he was an accomplished gentleman, and to the last enjoyed the respect and regard of the noblest and wisest in the land.

KEMMAYE, a sort of truffle which forms the chief vegetable food, while it is in season, of the Bedouins and Wahabis, and is a favourite dish also of the people of Syria. It lies about 4 inches under ground, and as it grows and enlarges it thrusts the earth upwards in a little hillock; sometimes the camels stumble over such little monticules. The Arabs dig it up and boil it in milk (or water) to a paste, butter is melted and poured over it, and the mass eaten hot. There are three sorts of kemmaye, each of a different colour—black, white, and red—all alike resembling the truffle in appearance and composition.

KEM'PIS, THOMAS A., a celebrated devotional writer, was born in 1379 or 1380 at Kempen, a German village in the diocese and principality of Cologne. His father was a poor hard-working labourer, and his mother kept a little school for the younger children of the village, both parents being persons of exemplary piety. The family surname was Hammerken (Lat. *Malleolus*, little hammer), the name by which Thomas is commonly known being derived from his birthplace. Thomas at an early age displayed such a devotion to learning that his parents resolved to make him a scholar, and when he was but twelve years of age he was sent to a school at Deventer, which had become celebrated as a place of education. Here he came in contact with the Brethren of the Common Life, a society of monastic mystics who chiefly employed themselves in the work of educating poor scholars, in works of practical benevolence, and in the copying of MSS. Thomas was introduced into the society by his elder brother John, who had become a canon of the monastery of Windesheim, and who recommended him to Florentius, its highly respected head and superintendent. Florentius received him with great kindness, assisted him in his studies, and discerning the simple earnestness of his character advised him to adopt the monastic life. After seven years' training at Deventer Thomas settled, in the year 1399, at the Convent of Mount St. Agnes, near the town of Zwolle, where his brother John was the first prior. Thomas passed five years as a novice, in the sixth he assumed the habit, professed the vows in 1407, and was ordained a priest in 1413. He was chosen subprior in 1425, and was afterwards made steward or treasurer; but for the latter office he proved "too simple in worldly affairs," and he obtained leave to resign it. In 1448 he was again elected subprior and retained the office until his death, which took place 8th August, 1471, at the age of ninety-one or ninety-two years. He is described as being low in stature, of a ruddy but brown complexion, and with bright brown eyes. He had a high reputation among his colleagues for sanctity and learning, and though a man of a genial and kindly disposition, his love of retirement and meditation, and his indifference to external affairs, made him remarkable even among a society of monks. The monastery which he joined was a poor one, and the monks endeavoured to earn their bread by working as copyists, Thomas being very skilled in this work and devoting to it a large portion of his time. He also composed numerous original works, which include sermons, letters, manuals of asceticism and devotion, books for children, and a few hymns. His abiding monument, however, and the

one work which has preserved his name, is the famous treatise "*De Imitatione Christi*." This celebrated devotional work has been more widely read in the Christian world than any other book save the Bible, and with the same exception no book has been translated into so many languages, ancient and modern. Concerning it, Dean Milman observes that "in it is gathered and concentrated all that is elevating, passionate, and profoundly pious in all the older mystics;" but he also points out its limitations: "its sole, single, exclusive object is the purification of the individual soul. . . . That which distinguishes Christianity . . . the love of man, is entirely left out." ("*Latin Christianity*," vol. vi. pp. 482-84). With the exception of the fourth book (which relates to the eucharist, and is based upon the doctrine of the real presence), the "*Imitation*" has been used as an aid to religious life by Christians of all denominations.

Up to the year 1604 the authorship of this work was almost universally ascribed to Thomas à Kempis, but in that year a controversy arose upon this point which afterwards assumed immense proportions. As we have already observed Thomas à Kempis was a diligent transcriber of the works of others as well as an original author, and many scholars have maintained that in sending forth the "*Imitation*" he was merely transcribing the work of another. Starting from this assumption the authorship of this book has been claimed for over twenty different persons, and the controversial works written upon the subject would form a large library. Among this great number of supposed authors other than Thomas à Kempis the claims of John Gerson, chancellor of Paris (1363-1429), and John Gersen, a mythical Benedictine abbot of Verceil, have received the largest amount of support. But though the controversy is by no means settled (an English book on this subject was published in 1877 and an elaborate German work in 1880), the balance of evidence, both internal and external, seems to incline unmistakably in favour of Thomas à Kempis. (See "*The Authorship of the De Imitatione Christi*," by Samuel Kettlewell, London, 1876.)

KEN, THOMAS, an English bishop, poet, and theological writer, was born at Berkhampstead, July, 1637. He was educated at Winchester and New College, Oxford, and in 1666 was appointed to the living of Brixton in the Isle of Wight. In 1669 he became prebendary of Winchester and rector of Woodhay in Hampshire. In 1675 he visited Italy and Rome in company with Isaac Walton, and after his return he was appointed chaplain to Charles II. At Winchester he was requested to receive Nell Gwynn into his house during the king's visit, but he refused and told the king he would not do it for his kingdom. Charles respected his fidelity and appointed him in 1681 to the bishopric of Bath and Wells. He attended Charles when he lay upon his deathbed, and he was with the Duke of Monmouth when the latter was brought to the scaffold. In 1688 Ken was one of the seven bishops who were committed by James II. to the Tower, but in 1689 he refused to take the oath of allegiance to William and Mary. In consequence he was deprived of his see, Bishop Kidder being appointed in his stead. Ken publicly protested against his deprivation, and then quietly retired to Longleat in Wiltshire, where he continued to reside until his death, 19th March, 1710, having firmly declined to be reinstated when the proposition was made by Queen Anne. An exemplary pastor and bishop he also enjoyed during his lifetime a high reputation as a preacher; but his works, consisting of poems, sermons, and theological treatises, which were published after his death (four vols., 1721), are now mostly forgotten. His "*Morning and Evening Hymns*," however, are universally known, and these alone would, in the words of Dean Plumtre, give him "a claim on the grateful reverence of all English-speaking Christians." (See also the "*Life of Bishop Ken*," by J. L. Anderson, London, 1853.)

KENDAL or **KIRKBY-KENDAL**, a market-town and municipal borough of England, in the county of Westmorland, is the largest and most important town in the county. It is situated in the midst of productive orchards, chiefly on the slope of a hill rising from the right or west bank of the Kent, 22 miles S.S.W. of Appleby, and 252 N.W. of London by the North-western Railway. One principal thoroughfare, a mile in length, runs nearly parallel to the course of the river, which is spanned by three stone bridges; another street, branching from this, leads to the northernmost of the three bridges, and connects the town with a suburb on the east bank. The houses in the principal thoroughfares are built of limestone and roofed with blue slate, and have a remarkably clean and neat appearance; many of those in the narrow lanes opening into the main streets are old structures, of rough stone plastered. The Church of the Holy Trinity is chiefly of Gothic character, and remarkable for its unusual width. The most ancient portion dates from the thirteenth century. The town also contains several other places of worship, a town hall, two hospitals, a grammar-school, mechanics' institution, and a museum. On the east side of the river are some ruins of the old castle of the barons of Kendal, which was the birthplace of Catharine Parr, one of the queens of Henry VIII. The Castle-How, or Castle Law Hill, an ancient earthwork, is on the west bank, almost directly opposite the castle. On the summit stands an obelisk erected in commemoration of the Revolution of 1688. Considerable manufactures are carried on at Kendal of linseys, horse-cloths, carpets, hosiery, and woollen and worsted goods generally. There are also large breweries, tanneries, and iron-foundries, some marble works, and the making of the fish-hooks, clogs, combs, and other small articles employs many hands. Kendal was made a market-town by license from Richard I., and became, by the settlement of the Flemings, under a certain John Kempe, in the reign of Edward III., the seat of a considerable manufacture of woollen cloths (anciently known as Kendals). It is still a very busy and prosperous place, with a large weekly market for corn and provisions. It has a station on the Lancaster and Carlisle Railway, and the Lancaster Canal terminates in the town. The municipal borough is divided into three wards, and governed by six aldermen, one of whom is mayor, and eighteen councillors. Kendal was formerly a parliamentary borough and returned one member to Parliament until 1885. The population in 1881 was 13,696.

KENILWORTH (*i.e.* Kenulph's worth or dwelling-place), a market-town of England, in the county of Warwick, 98 miles from London, consists principally of one long street, extending nearly a mile along the road from Coventry to Warwick; another street leads towards the castle, and near this road is the parish church, which is dedicated to St. Nicholas, and has some remains of ancient architecture, especially a fine and much enriched Norman entrance arch, in the lower part of an old tower, which is surmounted by a spire of more modern date. St. John's Church is a neat substantial building, erected in 1852. There is an ancient stone bridge over a brook flowing into the Avon. The most interesting object, however, is the castle, the ruins of which are extensive. It was built by Geoffrey de Clinton in the reign of Henry I., and after having been possessed by three of his descendants, reverted to the crown. Henry III. then bestowed it on the great Simon de Montfort, earl of Leicester, by whose son it was held during the Barons' War as an important centre of operations. After the death of the earl at Evesham, it was besieged by the royal forces in 1218, and captured. It was next conferred upon the king's younger son, Edmund, earl of Leicester. In the reign of Edward I. it was the scene of a magnificent tournament, at which 100 knights displayed their prowess. It afterwards passed into the

hands of John of Gaunt, who made large additions to the fortress. It became the property of the crown on the accession of his son, as Henry IV., and remained a royal appanage until conferred by Queen Elizabeth upon her favourite, Robert Dudley, earl of Leicester, who expended in the improvement and embellishment of the castle and its demesnes £60,000, or at the present value of money, £500,000. Here he entertained Queen Elizabeth in 1566, 1568, and 1575; on the last occasion with a splendour which has become familiarized to every reader by Scott's picturesque description in his romance of "Kenilworth." For seventeen days the queen was entertained at a cost of £1000 a day, with every variety of entertainment that the earl's fancy could devise and his wealth carry out. The castle was dismantled after the Civil War, and at the Restoration Charles II. granted Kenilworth to Lawrence Hyde, afterwards Earl of Rochester, from whom it has descended, by marriage, to the Villers family, now represented by the Earl of Clarendon. The ancient abbey, whose ruins date from the same period as the castle, also belongs to this nobleman.

The principal portions of the castle, the outer wall of which incloses an area of seven acres, are the gallery tower, the great gate-house, the keep or Caesar's tower, the strong or Mervyn's tower, where, according to Scott's novel, was Amy Robsart's chamber during her visit to Kenilworth while the queen was being entertained—though in truth Amy Robsart as she appears in the novel is a pure creation of the novelist's imagination—the great hall (190 feet by 45), the white hall (50 feet by 25), and the stately range of Leicester's Buildings. The gateway is in good preservation, and eminently picturesque. The inhabitants of Kenilworth are principally employed in tanning and comb-making. The population at the census of 1881 was 4150.

KENNET RIVER. See BERKSHIRE.

KENNICOTT, BENJAMIN, an eminent Hebrew scholar, was born at Totness in Devonshire, 4th April, 1718. He came of humble parentage, his father being master of a charity school, and at an early age Benjamin was appointed his successor. His industry in the pursuit of learning induced some wealthy friends to subscribe a sum sufficient to send him to Oxford in 1744. Here he published, while an undergraduate, a dissertation on the "Tree of Life," and another on "The Oblations of Cain and Abel," which procured him the degree of B.A. a year before the usual time. Soon afterwards he was elected a fellow of Exeter College, took his M.A. degree in 1750, and in 1767 was made keeper of the Radcliffe Library and D.D. He was afterwards made canon of Christ Church and rector of Culliam. He died at Oxford, 18th September, 1783.

Kennicott's name will always be remembered in connection with the study of the Hebrew text of the Old Testament scriptures, to the investigation of which he devoted thirty years of patient labour. He was one of the first to indicate the true condition of the text in the hands of scholars, and in the face of much opposition he succeeded in raising a fund for the purpose of obtaining collations of all the Hebrew and Samaritan MSS. known to be in existence. The assistance of many English and European scholars was obtained for the work, and Kennicott himself laboured from ten to fourteen hours a day in the undertaking. The results were published in the celebrated Oxford edition of the "Hebrew Bible" in two vols. folio (1776-78), in which the text of Van der Hooght was taken as a basis, and the different readings collected from 615 MSS. were printed at the bottom of the page. Kennicott's other works were two dissertations on "The State of the Printed Hebrew Text of the Old Testament" (1758 and 1759), a "Dissertation on the Samaritan Pentateuch," a short "Introduction to Hebrew Criticism," and also some sermons, letters, and pamphlets.

KENSINGTON GARDENS, one of the public ornamental parks of London, lie on the west side of Hyde Park, to which they form an excellent adjunct, though quite distinct in character. Intended only for the pedestrian, they are conspicuous for presenting one immense and almost continuous mass of shade, beneath the noble avenues and clumps of fine old trees. King William III. bought the gardens, which at that time only occupied 26 acres, adjoining a palace known as Kensington House. Queen Anne enlarged them to 56 acres, and Queen Caroline to their present extent, by taking 300 acres out of Hyde Park and forming the Serpentine out of a series of ponds.

A magnificent monument, in memory of the late lamented Prince Consort, was erected during the years 1866-76, on the south side of Kensington Gardens. The funds were partly raised by public subscription, and partly voted by the House of Commons. In Kensington Palace, a plain and irregular building of red brick, William III. and his queen, Queen Anne, and George II. breathed their last, and there her Majesty Queen Victoria was born.

KENT, a maritime county of England, is bounded N. by the estuary of the river Thames, E. by the German Ocean and the Straits of Dover, S. by Sussex, and W. by Surrey. A detached portion of the parish of Woolwich in Kent, about 400 acres, lies on the north side of the Thames. The greatest length of the county, from east to west, is about 64 miles; the greatest breadth, north to south, is about 40 miles. The area is 1570 square miles, or 1,004,984 acres. The population in 1881 was 977,585.

Coast-line, Islands, &c.—The northern part of the county, along the estuary of the Thames, is skirted by a line of marshes, which are very extensive near the junction of the Thames and the Medway, forming a portion of the Isle of Grain. Eastward of this island lies the Isle of Sheppey, extending about 10 miles by 5, the surface of which is laid down for the most part in grass, but the upland part on the northern side produces good corn. The marshes terminate east of the Swale, and the coast again rises to some height in clayey cliffs, which extend past Herne Bay and Reculver nearly to the Isle of Thanet. In this isle, which occupies the north-eastern corner of the county, and was formerly separated from it by the Stour, the chalk cliffs commence, and continue along the whole line of coast to Pegwell Bay, which is the boundary of the isle to the south-east. The North Foreland is a projection of the Isle of Thanet, due east of Margate. The chalk cliffs of the so-called island are succeeded by the low shore of Pegwell Bay, which continues to Walmer Castle near Deal. Here the chalk cliffs recommence, and continue round the South Foreland to Sandgate, presenting many lofty heights near Dover. From Sandgate the coast begins to decline until it forms the extensive tract of Romney Marsh, which ends on the borders of Sussex, at Winchelsea. Opposite Deal lie the **GOODWIN SANDS**, the channel between which and the Kentish coast forms the well-known roadstead of the Downs.

The Downs, which are about 8 miles in length and 6 in width, and vary in depth from 4 to 12 fathoms, are a safe anchorage in most winds, and are the general rendezvous of shipping leaving the Thames for the Channel or returning homeward. To the north of the Downs lies a smaller roadstead immediately contiguous, called "The Small Downs." The name is derived from the *dunes*, or sand-heaps, of the Goodwins and the shore.

Surface and Geology.—Kent is on the whole a hilly county. The chalk range of the North Downs enters it on the west side from Surrey, and runs nearly east through the county, being cut by the valleys of the Darent, the Medway, and the Stour. Many of its hills rise from 400 to 600 feet in height; and the range terminates on the coast between Folkestone and Walmer, where it forms a mass of white cliff, the "white walls of Albion."

The district between the chalk and the estuary of the Thames is, for the most part, occupied by plastic clay, which immediately overlies the chalk, and is again overlaid by the London clay in the Isles of Grain and of Sheppey, in the shore near Reculver, and in other parts of the county, including Shooter's Hill.

South of the North Downs the chalk marl and greensand crop out, and cover a belt of land which skirts the chalk throughout the whole extent of the county from west to east. South of this belt lies another occupied by the Weald clay, about 5 miles in width; and this is bounded on the south by a belt of Hastings sand. The Weald of Kent was anciently an immense forest (the ancient *Andredes-weald*), inhabited only by deer and hogs. The greater part of it has, however, been gradually cleared and brought into cultivation, though it is still interspersed with numerous oak woods and groves of beech.

Hydrography and Communications.—The northern boundary is formed by the Thames, to the basin of which nearly the whole county belongs. The other principal rivers are the Ravensbourne, the Darent, and the Medway, which flow into the Thames; and the Stour and the Rother, which flow into the sea. The lengths of the rivers are about as follows:—The Ravensbourne, 10 miles; Darent, 20; Cray, 9; Medway, 60; Eden, 16; Teise, 17; Beult, 20; Stour, 45. The Medway is by far the most important of these; it rises near East Grinstead, and flows past Penshurst, Tonbridge, Yalding, Maidstone, Rochester, and Chatham, to the Thames at Sheerness. The tide flows up to Maidstone Bridge. Ships and large vessels cannot ascend above Rochester Bridge. Below Rochester the estuary gradually expands to a considerable width, and forms an important harbour for the British navy. Numerous arms of the river or creeks penetrate the marshes, which spread inland to a considerable extent from the banks of the river. As high as Rochester it is under the conservancy of commissioners. Its upper course embraces a succession of beautiful scenery. The Stour has its rise in the chalk-hills; it flows north-north-east past Canterbury, where it becomes navigable, and in the lower part of its course divides into two branches, the Greater and the Lesser Stour. A branch, anciently called the *Wantsum*, separated the Isle of Thanet from the rest of the county, but has long ceased to have a distinct channel. The waters of the Lesser Stour have been employed for purposes of irrigation, and hence this branch is no longer navigable, but small craft ascend the Greater Stour as high as Canterbury. The former falls into the estuary of the Thames at Reculver, the latter into the English Channel at Pegwell Bay.

Kent has a most abundant steam traffic from Ramsgate, Margate, Sheerness, Gravesend, Greenhithe, Erith, Woolwich, and Greenwich, to London; from Dover to Ostend, Calais, and Boulogne; and from Folkestone to Bonlogne. The South-eastern, North Kent, and the London, Chatham, and Dover Railways, with their branches, traverse the county.

Climate and Agriculture.—The climate of Kent is in general mild and genial. The soil may be divided into the gravel, chalk, and clay, which produce, where they mix in due proportions, an extremely fertile loam. The alluvial soils along the Thames and Medway, and in Romney Marsh, produce some of the richest marsh pastures in the kingdom.

Throughout the whole county the clay may be said to predominate, and the mode of cultivation generally adopted is that which suits the strongest soils. On the hills, however, chalk and gravel are the main ingredients of the surface soil.

The products of Kent are more varied than those of any other British county, and, owing to the drier climate, generally superior in quality. Wheat, barley, and other

grains, turnips, clover, &c., are of the finest growth. The county also produces several crops which are peculiar to it, such as canary and radish seed, grown chiefly in the Isle of Thanet. Other seeds are likewise raised for the London seedsmen, such as spinach, cresses, and white mustard. Kidney beans are cultivated to a considerable extent in the neighbourhood of Sandwich, and from 10 to 20 bushels per acre are produced. Woad and madder were formerly more commonly cultivated in Kent than they are now; the foreign, being raised at a less expense, has driven the Kentish out of the market. Hops, though grown largely in other counties, form an almost typical Kentish industry. In those portions of the county which are suited to their cultivation immense numbers of acres are annually planted as hop gardens, the more thickly, perhaps, as the line of demarcation as to where a hop will and will not grow is so curiously marked. Even within a few miles the character of the hop plant differs very considerably, so much so that certain very limited districts are much more valuable for their known yields and qualities than others. The Maidstone district is the richest and most prolific, and especially that part to the south lying between Watlingbury and Paddock Wood. The hop country extends north-east as far as Faversham, and from thence to Canterbury and Wingham, beyond which, towards the east or south, no hops are seen, while Sevenoaks appears to mark the boundary on the west.

There is comparatively but a small proportion of grass land in Kent, if we except the sheep downs on the chalk hills and the marshes. Romney Marsh, which is well known for the richness of its grass, contains about 41,000 acres: on the borders of the Stour are 27,000; and along the Medway, Thames, and Swale about 11,500 more, on which a great number of sheep are reared and fattened. The Romney breed is noted for its long wool.

According to the official agricultural statistics published in 1885 there were 750,000 acres—or about seven-tenths of the entire area—under cultivation in that year. Corn was grown on 210,000 acres; green crops on 90,000 acres; hops on 44,000 acres; and 350,000 acres were devoted to permanent pasture.

The dairies of any consequence in Kent are few, and no cheese is made except for domestic consumption. The number of cattle in the county in 1885 was 75,000; of sheep, 1,000,000; and of pigs, 70,000.

In that part of Kent which is nearest to London there are many extensive gardens. Great quantities of pease are cultivated on the line of road from London to Rochester; and apples, pears, plums, and cherries are grown in extensive orchards for the supply of the London markets. The cultivation of filberts is peculiar to Kent, and carried on with peculiar success in the neighbourhood of Maidstone.

Throughout the county agriculture is in an advanced state. The estates are small, owing to the Saxon custom of gavelkind, which is still maintained here, and by which the lands of a father dying intestate are divided among all the sons alike.

There are several important paper factories on the Darent and the Medway, as well as corn, oil, silk-printing, and gunpowder mills in the county, and shipbuilding is extensively carried on on the sea-board. There are two important royal dockyards situated within the county, Chatham and Sheerness.

There are still some extensive woods in Kent, but they are diminishing every year; and the produce of bark and timber is much reduced from its ancient amount. The demand for hop poles has caused more attention to be paid to underwood; and some of the coppices which are well managed give a sufficient return to prevent their being converted into arable land.

History and Antiquities.—The name of this county is supposed to be Celtic, and Dr. Guest identifies it with

Caint, or the open country. For richness in memorials of the early inhabitants probably there is no county in Britain more valuable than Kent, as from its position it naturally received the first shock of the visits of strangers, whether friendly or otherwise. Of British remains there are not a few in the shape of camps and sepulchral stones, such as Kit's Coty House, near Aylesford, and the stone circles and avenues between it and Addington. The curious chalk excavations at Crayford and Dartford, although more obscure, are generally thought to be of British date, and as they are called locally Danes' pits, they are probably connected in some way with the invasion of the Danes. It is known that they were worked as chalk-pits in the time of the Romans; but as that people notoriously utilized the existing resources of all countries which they conquered, it is probable enough that these excavations were of earlier date. No portion of England played a more important part than Kent in the Roman times; it was the scene of Cæsar's first attack; and in most of the subsequent invasions it lay, from its proximity to the Continent, in the track of the invaders. There were Roman stations at Reculver, Richborough, Dover, and Hythe; and roads from Canterbury to these places and to London by the road called Watling Street. Richborough Castle, near Sandwich, is the *Rutupie* of the Romans. The walls form a parallelogram, but that on the eastern side has disappeared, and probably fallen into the Stour. The area within the walls is 5 acres. A quarter of a mile from the south-west angle of the castle lie the remains of a Roman circular amphitheatre of about 70 yards diameter. Many portions of the Brito-Roman Watling Street coincide with the present high road from London to Canterbury.

In the Saxon invasion Kent was the scene of interesting events. The brothers Hengest and Horsa landed in Pegwell Bay, probably about 446 or 449, though Kemble and Lappenberg impugn the authenticity of this historical incident. Having received a grant of the Isle of Thanet, then insulated by a channel of some width, they received accessions of strength from their countrymen at home, and were soon involved in hostilities with the Britons. Many irruptions of the Jutes followed, and many battles with the Britons. In 752 Kent was subject to Mercia, being the first established kingdom of the Saxon Heptarchy. In 823, after the successes of Egbert, it became a subordinate part of the West Saxon empire, commonly forming the appanage of the eldest son, or heir-apparent, of the King of Wessex. During the reign of Ethelwulf in Wessex, and of his sons in Kent, the latter kingdom was repeatedly attacked by the Danes, and down to the time of the Norman Conquest this county was seldom free for any considerable period from their incursions.

At the great battle of Hastings the men of Kent formed the vanguard of the Anglo-Saxon army. At the outbreak of the War of the Roses in 1451 Richard, duke of York, encamped near Dartford, where he fortified himself. Henry VI. made Blackheath his headquarters. In the Civil War a severe battle was fought at Maidstone in 1648, in which the Parliamentarians, under Fairfax, obtained a complete victory. In 1667 a detachment from the Dutch fleet under De Ruyter sailed up the Medway, and in defiance of the forts on its banks succeeded in burning many vessels and a considerable quantity of stores.

Of ancient castellated edifices the most remarkable are the castles of Rochester, Dover, Leeds, Chilham, Tonbridge, and Westerhanger, to which may be added the manorial mansions of Penshurst, Knole, Hever, Allington, and Cobham. Leeds Castle, partly modernized, is surrounded by a broad moat; the entrance is by a stone bridge of two pointed arches, and through a deep gateway in good preservation. Another gateway, which defended the entrance of the bridge, is in ruins. Hever Castle, the seat of the Boleyns, is surrounded by a moat; the entrance gateway

is flanked by round towers; the inner buildings form a quadrangle inclosing a court. Chillham Castle was a Norman structure, of which the keep is the only part now remaining. Of Westerhanger the principal relics are the outer walls, with the towers of the north and east sides. Penshurst Place is one of those castellated dwellings that immediately succeeded the baronial castles of a more troubled period. The principal buildings form a quadrangle inclosing a spacious court, and comprehending a hall, chapel, and other apartments. Knole is another extensive and magnificent mansion; the principal buildings form a capacious quadrangle, and are in the castellated style. The greater part is of the fifteenth century, but some portions are yet older.

Of monastic remains the principal are St. Augustine's Abbey at Canterbury, Aylesford Priory, St. Radigund's Abbey, near Dover, the abbey of Faversham and Malling, the priories of Tonbridge and Folkestone, and Boxley Abbey, near Maidstone. Besides the cathedrals at Canterbury and Rochester, the most interesting ancient church, perhaps, is that of Barfreston, between Canterbury and Dover.

KENTISH FIRE, a term used to designate fervent and repeated rounds of applause awarded to orators at public meetings. It owes its origin to the No-Popery meetings which were held in Kent to protest against the passing of the Roman Catholic Relief Bill, 1828-29.

KENTISH RAG is an impure calcareous grit that occurs near the base of the lower greensand in Kent; it rests on the Atherfield clay, is fossiliferous, and from it a good building stone is obtained near Maidstone.

KENT'S CAVERN, a famous bone cave in the neighbourhood of Torquay in Devonshire. Here a regular series of deposits is recognized. The first consists of fragments of limestone, followed by a black mould, the remains in which are those of species still existing. The cave earth, granular stalagmite, and blackband have yielded bones of the hyæna (which made the cavern its home), rhinoceros, gigantic Irish deer, red deer, bison, wild bull, mammoth, badger, cave bear, grizzly bear, brown bear, cave lion, fox, reindeer, *Machairodus latidens* (the great sabre-toothed tiger), glutton, and man. In the crystalline stalagmite and the breccia the remains, with the exception of a few feline teeth, are only of bears. Hence in the life-history of Kent's Cavern the time of the deposition of the cave earth, with that of the granular stalagmite and the blackband, is called the Hyænnine period; that of the crystalline stalagmite and the breccia the Ursine period. Relics of man's handiwork have been found in both series of deposits. The flint and chert implements of the Hyænnine period are ovoid and lanceolate; and there have also been found bone implements in the cave earth, including a needle and harpoons. The implements of the Ursine period, much more rudely formed, are exclusively of flint and chert.

KENT'S HOLE is the name of one of the earliest discovered BONE CAVES in England. It occurs near Torquay in Devon, and in it were found the bones of the rhinoceros, horse, ox, Irish elk, reindeer, of bears, hyænas, wolves, besides of many other animals associated with the relics of Neolithic CAVE-MEN.

KENTUCKY, one of the United States of North America, is situated between 36° 30' and 39° N. latitude



Mammoth Cave, Kentucky.

between 82° and 89° 39' W. lon. It is bounded N. by Ohio, Indiana, and Illinois, from which it is separated by the river Ohio; E. by Virginia; S. by Tennessee; and W. by the Mississippi, which separates it from Missouri. Its greatest length is about 450 miles, and its greatest breadth about 170—area, 37,680 square miles. The population in 1880 was 1,648,599.

Surface.—The south-eastern and eastern parts of Ken-

tucky are covered with mountain ridges and high hills. None of the summits of these mountains appear to attain the height of 3000 feet above the sea. The highest range is that of the Cumberland Mountains in the south-east. To the west of the hilly region lies an upland region, which extends to about 86° W. lon. The surface is undulating, but it is intersected by numerous river beds, which are from 100 to 300 feet below the surface of the plain. The

soil is of the finest quality. Limestone is the prevailing rock, and forms many caverns, sink-holes in which streams disappear, producing much romantic river-cliff scenery. The famous Mammoth Cave is the largest of the caverns, and is regarded as one of the greatest wonders on the American continent. It has been traced 10 miles in direct distance, and contains open areas unsupported by pillars 2 acres in extent; the length of all the galleries and chambers has been estimated at 40 miles. It contains lakes and running water, which is known to discharge through a subterranean passage, and at last to reach the open air at a lower level. These waters are inhabited by several fishes and amphibious lizards of peculiar species, colourless, and without eyes, or having the organ in an undeveloped state; the lizards have both lungs and gills, adapting them to either mode of life. There are also the blind fish and other creatures similar to those in the Indiana Cave—in all seventeen species. Salt springs abound, and large quantities of salt are made from them. The soil around these springs is impregnated with the mineral, and is much resorted to by wild animals, which lick the mud; it is in such "licks" that the skeletons of gigantic extinct quadrupeds are chiefly found in the west country, the animals having been doubtless "mired" when resorting to the springs, as often happens to the buffalo at the present day. The most western portion of the state is divided between the Barrens and a country which is partially hilly. The Barrens are in the south-west, between Green River and Cumberland River. In their natural state they are generally destitute of trees, and resemble the prairies or savannahs which occur north of the Ohio. Though this tract does not deserve the name which it bears, it is of inferior fertility when compared with the upland region.

Hydrography.—Along the northern boundary runs the Ohio, which receives all the larger rivers that drain Kentucky. The most eastern is the Sandy River, which separates this state from a part of Virginia. It flows in a northern direction, and has a course of about 250 miles. The branches of the river Kentucky rise in the eastern part of the state, and form by their union a considerable stream, which first flows north-west, then west, and at last nearly due north. Its course is about 280 miles, and though very rapid, it has been made navigable for steamers throughout 260 miles. Green River rises in the western districts of the upland region, and flows west; north-west, and north to the Ohio. Its course is 280 miles. Cumberland River rises in the eastern part of the state, and flows west and south into Tennessee, where it makes a large bend, then re-enters Kentucky, and flows north-west to the Ohio. It is above 500 miles long. Licking River and Salt River are also of considerable size. The river Tennessee flows only about 70 miles through Kentucky.

Climate, Products, &c.—The mean annual temperature of Kentucky seems to be about 55° , or 5° higher than that of London; but the differences in the extremes of heat and cold are much greater. The climate is considered healthy, except near the Mississippi; the winters are generally mild and humid. Wheat, tobacco, and hemp are the staple products; but Indian corn, rye, oats, barley, buckwheat, flax, and potatoes are also cultivated. Horses, cattle, bacon, beef, pork, and dairy produce are largely exported. The breed of horses is greatly valued throughout the Union. The forests support millions of swine, and there is abundant pasturage for almost endless herds of cattle. Iron, lead, marble, coal, salt, and lime are obtained. The greater part of the products of the state pass down the Ohio and Mississippi to New Orleans.

The capital of the state is Frankfort, but the most important town is Louisville.

History.—The first Europeans arrived here in 1707, and the first settlement was formed in 1775. It was originally a part of Virginia, but the population having

increased rapidly Virginia consented to a separation. The first constitution was formed in 1790, and its present constitution in 1799. In the American civil war, 1861-65, Kentucky was the scene of many conflicts, and its inhabitants were divided. The name of the state is of Indian origin, and signifies "the dark and bloody ground," in consequence of the sanguinary contests which took place on its soil in the displacement of the old and warlike Indian tribes.

KEPLER, JOHN, a celebrated astronomer, was born at Weil, a small town of Württemberg, on the 21st December, 1571. His early life would have seemed to render it impossible for him even to become decently educated. His father, after a restless life, deserted his family altogether. When a child John Kepler was attacked by small-pox so severely that his hands were crippled and his eyes enfeebled for the rest of his life. Other illnesses kept him from school, and lastly he had to help to earn a pittance for the family by working as a farm boy. In 1586 he was admitted into the school at the monastery of Maulbronn, where he was educated at the expense of the Duke of Württemberg. Here his mind quickly displayed its power, and he gained a full scholarship, in 1588, at the University of Tübingen, where he took his degree of master in 1591, holding the second place in the examination. While he was attending the lectures of the celebrated Moestlin, who had distinguished himself by an oration in favour of Copernicus, Kepler became a convert to the opinions of his master, and wrote an essay on the primary motion (the apparent daily motion of the heavenly bodies), in order to prove that it was produced by the diurnal rotation of the earth upon its axis. He succeeded George Stadt as professor of astronomy at Grätz in 1594. In 1595, "when he had some intermission of his lectures, he brooded with the whole energy of his mind on the subject, inquiring pertinaciously why the number, the size, and the motion of the planetary orbits were not other than they are." His "*Prodnus Dissertationum Cosmographicorum*" appeared at Tübingen in 1596, and was commended by Galileo and Tycho Brahe; but the latter judiciously advised him "to obtain a solid foundation for his views from actual observations, and then by ascending from these to strive to reach the cause of things." The severities of the Archduke Ferdinand had driven away the students (and Kepler himself fled at first, though he afterwards returned) on his accession in 1598. Kepler was therefore dismissed from Grätz in 1600. Seeking work to do he paid a visit to Tycho, then living at Benach, near Prague, an exile from his country, and in 1601 was introduced by him to the Emperor Rudolph II., who conferred upon him the post of imperial mathematician on the condition of his assisting Tycho. The two astronomers now agreed to combine their talents in completing the computation of new astronomical tables, to be called the Rudolphine Tables, from the generosity of the emperor, who had promised to defray the expense of them. The death of Tycho in October, 1601, put a stop to this important arrangement; but Kepler was appointed principal mathematician to the emperor, with the promise of a salary which, though reduced from Tycho's, was yet ample, if only it had been paid. This promise, however, was not fulfilled; and from the non-payment of his salary he was obliged to postpone the Rudolphine Tables, to devote his time to the completion of other works, and even to cast nativities, at that time the principal function of astronomers in the eyes of the public, though it plainly appears from other parts of his writings that he held astrology in contempt. In 1602 he published at Prague his work, "*De Fundamentis Astrologiæ*;" and in 1604, at Frankfurt, his "*Paralipomena ad Vitellionem*"—a work containing much new and interesting information on dioptrics and vision. In 1605 he published his "*Epistola de Solis Deliquio*," and in 1606 his treatise, "*De Stella Nova*," the new star which appeared

in 1604 in *Serpentarius*, and which, like that of 1572, rivalled even *Venus* in lustre. In 1609 Kepler published at Prague his greatest work, entitled "*Astronomia Nova, sive physica coelestis tradita commentariis de motibus stellæ Martis*," the foundation of the science of astronomy as we now pursue it, substituting proof for hypothesis, and demonstrating the great principle of the planets sweeping over equal areas in equal times, and moving in an elliptical orbit. In 1611 he published at Frankfurt his "*Dioptrica*," with an appendix on the use of optics in philosophy. In this excellent work, which was reprinted in London in 1653, he explained the principle of the telescope, and described the astronomical telescope with two convex lenses, which was his own invention, and which was greatly superior to that of Galileo, from its admitting in front of the eye-glass micrometer wires for measuring distances in the heavens. He proved that spherical surfaces cannot converge rays to a single focus; and he conjectured, what Descartes afterwards proved, that this property might be possessed by surfaces having the figures of some of the conic sections. In the year 1615 Kepler published at Linz, whither he had been compelled to go in 1612, to obtain some office whereby to live, that book which is so remarkable as containing the germs of the Infinitesimal Calculus, entitled "*Nova Stereometria*," and in 1617 appeared his "*Ephemeridès*" for 1617-20, the *Ephemeris* for 1620 having been dedicated to Baron Napier of Merchiston; and in 1624 he published his "*Chilias Logarithmorum*," an imperfect table of logarithms. In 1618 he also published at Linz the three first books of his "*Epitome Astronomiæ Copernicæ*," extending to Jupiter and his moons the theory of the sun and Mars, &c. In 1619 he elaborated a fantastic theory on the possible music produced by the revolution of the planets, and heard by the sun, and this, the "*Harmonice Mundi*," he dedicated to James I. of England. It also contained the third law. James was so pleased with it that he pressed him (but in vain) to take service in England. The fourth book of the "*Epitome*" was published at Linz in 1622; and in the same year the fifth, sixth, and seventh books appeared at Frankfurt. This work, which contains a summary of his astronomical discoveries, was prohibited both at Rome and Florence, to the great annoyance of its author.

When Ferdinand succeeded to the imperial throne, he ordered the arrears of Kepler's salary (12,000 florins) to be paid, but this was not carried into effect. However he supplied the means of publishing the *Rudolphine Tables*, which appeared at Ulm in one volume folio in 1627. Honours and appointments were now showered upon the astronomer. The Grand-duke of Tuscany sent him a gold chain in approbation of his services to science; and the Duke of Friedland (Wallenstein) induced him, by the munificence of his offers, to settle at Sagan in Silesia in 1628. Here he continued the printing of those valuable *Ephemeridès* which form such a treasure to astronomers, predicted several eclipses, and did other good astronomical work. After many months of waiting Wallenstein still deferred the settlement of the arrears of salary, which he had undertaken to pay, and Kepler therefore determined to appeal for justice to the diet of the emperor. In this hope he went to Ratisbon; but the fatigue of this journey, combined with mental anxiety, threw him into a fever, which carried him off on the 5th of November, 1630, in the sixtieth year of his age, leaving behind him his second wife, three daughters, and four sons, all of whom died young, excepting Louis, a physician at Königsberg, who died in 1663. The remains of Kepler were interred in St. Peter's churchyard at Ratisbon. One episode in Kepler's life, a painful one, is very noteworthy as showing the disturbed nature of the time he lived in. His mother, then seventy-four, was arrested for sorcery in 1620, and suffered an imprisonment of more than a year. Torture was often threatened, but never probably

really applied. Kepler spent his whole time devotedly in her service, and succeeded in freeing her; but the shock had been too great even for a very courageous woman, as she was, and she died almost immediately after her liberation.

Both Kepler and Newton were profoundly devout. Kepler has left us a touching testimony of his sentiments in the following prayer placed by him at the end of one of his works:—"Before quitting this table, upon which I have made all my researches, it only remains for me to raise my eyes and my hands towards heaven, and address with devotion my humble prayer to the Author of all illumination: 'Oh, thou who, by the glorious light which thou hast shed over all nature, raisest our desires up to the sacred light of thy grace, in order that we may be one day transported unto the eternal light of thy glory, I give thee thanks, my Lord and my Creator, for all the joys that I have experienced in the ecstasies into which I have been thrown by the contemplation of the work of thy hands! Now I have completed this book, which contains the fruit of my labours, and I have used in composing it the whole of the intelligence that thou hast given me. I have set forth before men the grandeur of thy works; I have explained these mysteries as well as my finite mind has permitted me to embrace the infinite extent of them. I have made all efforts to arrive at truth by the ways of philosophy; and if it has occurred to me—a despicable worm, conceived and brought up in sin—to say anything unworthy of thee, make me know it, in order that I may remove it. Have I allowed myself to cherish any self-complacent presumption in the presence of the admirable beauties of thy works? Have I proposed to myself my own renown among men by raising this monument, which ought to have been consecrated entirely to thy glory? Oh! if it has been so, receive me in thy clemency and mercy, and grant me this favour: that the work I have just finished may ever be powerless to do evil, and that it may contribute to thy glory and to the good of souls!'"

KEPLER'S LAWS, the name given to certain truths discovered by the astronomer, noticed in the preceding article, which form the foundation of the whole theory of gravitation and physical astronomy:—(1) That the planets describe elliptical orbits, each of which has one of its foci in the same point, namely, the sun's centre; (2) that the area described by the revolution of the line drawn from the planet to the sun (its radius vector) is proportional to the time occupied in its description; and (3) that the squares of the times of the revolutions of the planets are proportional to the cubes of their mean distances from the sun. This latter was discovered by Kepler in 1618, and is embodied in the treatise dedicated to James I. of England, which so nearly resulted in Kepler becoming an English professor. In fact it was only his profound attachment to his native land which could overcome solicitations so pressing as those of Sir Henry Wilton.

KERAR GYRITE. See HORN-SILVER.

KERATIN is generally set down as a variety of gelatin, but is sharply distinguished from the usual gelatinous forms by physiologists. It is obtained from hair, nails, feathers, horn, and dry skin, and differs from other gelatinous principles of the body by containing a little sulphur, and very markedly in its behaviour under reagents. Indeed, it is usually considered to be a compound body which physiologists have as yet failed to resolve into its components. Its composition varies considerably. Foster ("*Text-book of Physiology*," London, 1879) gives its formula as oxygen, 20.7 to 25 per cent.; hydrogen, 6.4 to 7; nitrogen, 16.2 to 17.7; carbon, 50.3 to 52.5; sulphur, 0.7 to 5. Keratin is partially soluble when heated long with water, and is wholly soluble by prolonged boiling with alkalis and acids. Aqueous solutions evolve sulphuretted hydrogen, and so do alkaline solutions when they are treated with acids. The sulphur is evidently very loosely combined.

KER'GUELEN CABBAGE, the name given by Captain Cook to a remarkable plant (*Pringlea antiscorbutica*) belonging to the order CRUCIFERÆ. It has a great resemblance to the common cabbage, but is much larger, is confined to Kerguelen Island, and is prized by seamen as an antiscorbutic.

KER'GUELEN ISLAND, or Land of Desolation, an island in the southern Indian Ocean, its southern extremity, Cape George, being in lat. 49° 54' S., lon. 70° 12' E. Length, about 100 miles; greatest breadth, 50 miles. It was discovered in 1772 by Kerguelen, a Frenchman, and visited in 1779 by Captain Cook, whose ships were the first that ever anchored in any of its numerous harbours. There are mountain ranges varying in height from 500 to 2500 feet, and the whole island is deeply indented by bays and inlets, and intersected by lakes and water-courses. Fossil-wood and a kind of coal abound, but the flora is scanty. It is 3000 miles from human habitation, and the generally sterile aspect of the island, and the absence of all animal life, except a few marine animals, which merely use the land for a resting-place and for breeding, has obtained for it the very fitting name of "Land of Desolation." The climate is also in keeping with the name. Mists and storms

are its normal condition. During three weeks in every month the wind blows a gale, and the greatest waves in the world are upheaved. It formed an eligible position for observing the transit of Venus on the 8th December, 1874, and is the better known through a small work subsequently published by the Rev. S. J. Perry, one of the men of science who volunteered to occupy this undesirable position on the occasion referred to.

KER'MES (*Lecanium ilicis*) is an insect found in the south of Europe, one of the COCCIDÆ, or scale insects. It was originally esteemed for affording a red and scarlet dye, to which the ancient tapestries of Flanders owe their brilliant beauty. The dye produced by the kermes was called *grain*, a name which is often used by the poets as equivalent to purple, as in Milton's "Il Penseroso"—

"All in a robe of darkest grain."

The kermes dye is now superseded by cochineal, which is also produced by one of the COCCIDÆ. The kermes insect is found on a species of oak (*Quercus coccifera*).

KERRY, a maritime county of the province of Munster, in Ireland, is bounded east by Limerick and Cork, south by Cork and the estuary of the Kenmare, west by



Gap of Dunloe.

the Atlantic Ocean, and north by the estuary of the Shannon. The greatest length from north to south is 60 miles, and from east to west 58 miles. The area is 1,159,856 acres, or 1811 square miles. In 1841 the inhabitants numbered 294,995; in 1881 they had decreased to 200,448, but still an increase of nearly 4000 on the census of 1871. The Roman Catholics numbered 193,917. In the more remote districts of the county a large proportion of the population speak only the Irish language.

Surface.—Kerry forms the south-western extremity of Ireland. The coast, which is bordered by the Atlantic, is deeply indented by the estuary of the Kenmare River, the Bay of Dingle, and the Bay of Tralee. Many islands fringe the coast, the principal of which are the Blasquet group, Valentia, and the pinnacled Skelligs. The peninsulas between the bays form the western extremities of that mountain system which, commencing in Waterford, extends with little interruption across the entire south of

Ireland. Beyond the range of mountains which crosses the centre of the county extends a rich and generally level country, which rises into rough land in only one direction, towards Kerry Head on the Shannon. The peninsula between the Kenmare estuary and Dingle Bay is cut by minor ranges of mountains into three principal valleys. It contains the rivers Roughty, Fartagh, Inny, Sneem, Little Blackwater, and others of smaller size. The mountain-knot called Macgillicuddy's Reeks, which extends about 10 miles in a direction south-west to north-east, subsiding into the plain at the head of Dingle Bay, contains Carran Tual, 3410 feet above the sea-level, and the highest summit in Ireland.

The Gap of Dunloe is a wild narrow pass, separating the Magillicuddy Reeks from Purple Mountain—a shoulder of the Tomies. On either hand the craggy cliffs, composed of huge masses of projecting rock, suspend fearfully over the narrow pathway. In the interstices of these immense fragments a few shrubs shoot out in fantastic shapes, which, with the dark ivy and luxuriant heather, contribute to the picturesque effect of the landscape. A small but rapid stream, called the Loe, traverses the whole length of the glen, expanding at different points into five small lakes. At one part of the glen the road becomes so contracted as scarcely to leave room between the precipitous sides for the scanty pathway.

Hydrography.—In a deep hollow between the south-eastern flank of this range and the group of Mangerton lies the upper Lake of Killarney. This beautiful sheet of water, which is 3 miles in length by three-fourths of a mile in breadth, is inclosed on all sides by mountains from 2000 to 3000 feet in height, except at one point, towards its eastern extremity, where it discharges its waters by a tortuous course of 3 miles between the southern declivities of Glenna and the precipitous side of Turk Mountain. A channel leading from the upper to the lower lake passes through a thickly wooded defile. About midway between the extremities of the channel a remarkable detached rock, called the Eagle's Nest, rises over the left bank to a height of 1100 feet. Emerging from this defile, the river expands into the lower Lake of Killarney, 5 miles in length by 3 in breadth, skirting the eastern declivities of the mountain range of Tomies and Glenna. These mountains, descending abruptly to the western verge of the lake, are still the resort of red deer, and are clothed with the richest natural woods of oak, ash, pine, alder, and beech, intermixed with hazel, white-thorn, yew, holly, and arbutus, from a height of several hundred feet down to the water's edge through a continuous distance of 6 miles. O'Sullivan's River, descending by a thickly wooded ravine on this side, forms a cascade 70 feet high, close to the shore of the lake. On the opposite side the low alluvial banks are everywhere broken into promontories and islands, on which the arbutus (commonly considered an exotic) grows in unusual luxuriance. The town of Killarney is situated on the plain about a mile from the eastern shore, and half a mile south of Killarney runs the Flesk, the chief feeder of the lake. Several other cascades and richly wooded promontories ornament the borders of the lake. The waters of the Lakes of Killarney discharge themselves at the northern extremity of the lower lake through the river Lanne, which runs by a course of 12 miles into the head of Dingle Bay.

Mountain ridges, bounding valleys of greater or less width, form the distinguishing features over the greater part of Kerry. The most extensive tract of open country is near the Limerick boundary; it is drained by the rivers Feale, Gale, and Brick, which, uniting within 5 miles of the sea, receive the common name of the Cashen River; the united length of their courses is about 50 miles. A rough district extends from the mouth of the Cashen to Beal Point, where the estuary of the Shannon first assumes the character of a river. The whole coast-line, from the Shan-

non to the Kenmare, contains many good harbours, of which that of Valentia is the most westerly in the British Islands. The *terminals* of the Atlantic submarine telegraphs are at this place.

Climate.—The climate is very moist from the vicinity of the Atlantic, and the south-western district is much exposed to storms. In the inland parts, however, especially in the neighbourhood of Killarney, the air is mild and genial, and vegetation extremely luxuriant.

Geology.—The geological structure of the chief mountain-chains is similar to that of the mountains in the west of Cork, the main component being a red or gray conglomerate and sandstone supporting flanks of silicious flags, and overlaid in the low districts by fields of floetz limestone. The mountains of Glanbehy abound with iron ore, which was formerly smelted in considerable quantities at Blackstones, in works erected by Sir William Petty; but the supply of timber having failed, these works were given up about the year 1750. Iron has been worked in other parts, and copper and lead also exist in the country. The slate quarry in Valentia produces flags and slates to a large amount.

The soil of the south-western district, where not encumbered with bogs, is an adhesive loam, fit for the reception of corn crops. The soil of the middle district is a rich loam, producing excellent crops of grain, and when laid down in pasture yields butter of prime quality. The northern district has a stiffer soil, more retentive of wet, and inclined to run to rushes. Cider is made in considerable quantity. The native breed of cattle is very small, but well formed, good milkers, and easily fattened. A breed of small ponies is peculiar to Kerry; they are too light for farming purposes, but answer for the saddle very well. Numerous goats and Irish cattle are pastured in the mountains, and a larger English cross-breed in the vales. The chief crops are potatoes, wheat, oats, and barley, the former of which is alone consumed by the producers, who are in general poor. The fisheries employ about 3000 men and boys.

The chief trade of the county consists in exports of agricultural produce, chiefly oats and butter. The manufacture of linen is carried on, but the quantity is insignificant. There is also a general manufacture of coarse woollens throughout the county for home consumption. Fishing is pursued extensively on the coasts. The chief town is Tralee.

History.—Kerry originally formed part of the kingdom of Desmond, or South Munster, of which the MacCarthy's were sovereigns. About 1177 part of the county came into the hands of Maurice Raymond, from whom the Fitzmaurices, lords of Kerry, draw their pedigree and the barony of Clannaurice takes its name. It was made a shire by King John in 1210. Soon afterwards the Fitzmaurices established themselves in the south of the county, and as earls of Desmond exercised powerful influence until the time of Elizabeth, when their authority was put an end to and their estates confiscated. From 1611 till 1691 there was almost a constant series of insurrections and confiscations.

Kerry contains several monuments of a very remote antiquity, of which the most remarkable are the Cyclopean stone fortress of Cahincree, Staigue, and Cahir Donnell; and the sepulchral stones with Celtic inscriptions in the neighbourhood of Dingle. There is a round tower at Rattoo, one on an island in Loch Currane, and part of another at Aghadoe. There are also the remains of thirteen religious houses and thirty feudal castles.

KERTCH, a seaport town of Russia, situated on the south-east of the Crimea, about 8 miles west of Yenikale, and celebrated as the place against which an Anglo-French expedition was sent during the siege of Sebastopol in 1854-55. The squadron sailed on the 24th of May, 1855. It was

garrisoned by the Russians; but on the approach of the enemy they blew up the magazines, destroyed the stores, and vacated the town. After this the expedition captured Yenikale, and entered the Sea of Azof, when Arabat, Genitch, and other places were attacked, and immense supplies of stores as well as numerous vessels laden with grain were destroyed. It is the quarantine station for the Sea of Azof, and has considerable trade. Its chief exports are corn, hides, skins, and salt, and it is very strongly fortified. The inhabitants are a commercial people, and their fisheries are very productive. It occupies the site of the ancient *Panticapum*, celebrated in the history of the Greek kingdom of the Bosphorus, and in the wars of Mithridates the Great with the Romans. The chief remains are the ruins of a palace on a platform 100 feet above the town. Highly interesting Greek and Græco-Scythian ornaments have been found in the tumuli here, many of which are now preserved in the Hermitage Museum at St. Petersburg. The town has been much improved in recent years, and trade has been greatly facilitated by deepening the bar of Yenikale. The population is about 20,000.

KESH'UB CHUNDER SEN. See **SEN** and **BRAMHO SOMAI.**

KESTREL (*Falco tinnunculus*) is the name of a well-known bird of prey belonging to the family Falconidae. The kestrel belongs to the group of "noble falcons," of which the peregrine falcon is the type. It is by some ornithologists separated from the genus *Falco* under the generic title of *Tinnunculus* (or *Cerchias*). This beautiful little falcon is the commonest bird of prey in this country. It is from 13 to 15 inches in length. In the male the tail is marked by a broad subterminal black bar. The wings, when closed, are about 2 inches shorter than the tail. The feathers of the back and the wing-coverts are a pale red with triangular black spots; those of the breast and belly are yellowish-red, with longitudinal, bar, and round spots. In the female all the upper parts are light red, with transverse spots of dark brown. The lower parts are paler, with oblong dark blotches. The back is blue, the cere and feet are yellow, and the claws black. The nest is frequently placed in towers and old buildings, though often the deserted nest of a crow or raven is used. The female lays from three to five eggs, which are roundish, pale orange-red, and irregularly patched. The favourite food of the kestrel consists of mice, which it destroys in immense quantities, a single kestrel being said to kill upwards of 10,000 of these little mammals during its stay in this country. As, in addition, the kestrel feeds largely on insects, it should certainly be considered a very useful bird to the farmer; it, however, is often confounded with the sparrow hawk, and suffers for the misdeeds of the latter bird. It occasionally kills and devours small birds, and may even at times destroy a young partridge or pheasant; frogs and earthworms are sometimes found in its crop. While on the lookout for its staple food the kestrel may be seen hovering in the air in a peculiar fashion. After advancing for a short distance it suddenly remains perfectly stationary, suspended in the air by very short but rapid motions of the wings; and during this halt its sharp eye is carefully inspecting the ground beneath it in search of the small game which constitutes its favourite food. Should there be nothing stirring in one place the bird moves on to another, and there resumes his inspection; but should a mouse or any other small animal make its appearance, the kestrel closes his wings and dashes down upon it instantly. It is from this habit that the bird has received the name of *wind-horer*. The common name *kestrel* refers to its peevish querulous note. The kestrel is a summer visitor to this country. It is widely distributed, extending over nearly the whole of Europe, Asia, and Africa; the bird found in Japan and China is considered a distinct species by some.

KESWICK (pronounced *Kes'ick*), the capital of the Lake district, is a market-town of England in the county of Cumberland, distant 299 miles from London, and 35 from Carlisle by rail, and situated on the Greta, near the east shore of the Lake of Derwentwater, at the south-east side of a wide level amphitheatre, encircled by high mountains, and containing two large lakes. The town is well built and of great antiquity, and consists of one long old street, from which more modern streets branch out. An abundant supply of water has been obtained from Skiddaw. A very large and handsome hotel stands near the railway station. There are also several other inns for the accommodation of tourists, some good shops, town-hall, which contains an interesting model of the Lake district on a scale of 3 inches to the mile, good public library, museum, lecture-hall, &c. In the parish church at Croasthwaite is a fine recumbent figure of Southey. Keswick Church is an elegant modern Gothic building, and there are several dissenting chapels. Blacklead pencils are made, and there are some small manufactories of coarse woollens and flannels. The population in 1881 was 2174. Before the rebellion of 1715 the earls of Derwentwater owned most of the property in the neighbourhood, and there are many tales current with respect to them, especially the last unfortunate representative of the family. Thus the aurora borealis is locally called Lord Derwentwater's Lights, because there was a great display on the night of the Earl of Derwentwater's execution in 1716. Greta Hall, in the vicinity, is interesting as having been for many years the residence of Southey. In addition to the beauty of its scenery, the lake is remarkable for presenting the phenomenon of a floating island, which at times rises from the bottom about 200 yards from the shore opposite Lodore.

KETCH'UP or, by "folk-etymology," **CATSUP**, a sauce or relish very commonly used with meat, fish, &c., the best quality of which is made from mushrooms. The word is East Indian, *kitchup* being the native designation of a somewhat similar sauce. There are several recipes for ketchup, the method most generally adopted being the following:—Fresh mushrooms are broken up and placed in a glazed vessel, after being freely sprinkled with salt. They are allowed to stand for two or three days, being stirred occasionally, after which the juice is pressed out and boiled. Before boiling spices are added: an ounce each of crushed black pepper, sliced ginger, allspice, and half an ounce each of crushed cloves and mustard seed being sufficient for each gallon of the liquid. After boiling, the whole is left to macerate for a fortnight, when the liquid is strained off and bottled for use. When well made and so bottled as to be kept from the air, it will remain sweet for a long period, but if the air is allowed access it quickly spoils. Ketchup is also sometimes given as a name to pickles made from green walnuts, from the green outer covering of the ripe walnuts, from cucumbers, from tomatoes, and from shell-fish.

KETTERING, a market-town of England in the county of, and 13 miles north-west by north from Northampton, and 70 from London by the Midland Railway, is situated on the slope of a hill, at the foot of which runs a small brook, a feeder of the Ise. The market-place is spacious, and is surrounded by well-built houses and respectable shops. A town-hall and corn exchange was erected in 1863. The Church of St. Peter and St. Paul, a large and handsome building of Perpendicular character, was restored in 1862. The Church of St. Andrew was built in 1870. A Baptist chapel was built in 1861, and one for the Wesleyans in 1868. There is a considerable manufacture of shoes and agricultural implements. The making of stays and ready-made clothing also employs many hands. Three miles distant, at Geddington, is one of the ten Eleanor crosses. The population in 1881 was 11,095.

KETTLEDRUM. See **DRUM.**

KEUPER, or **UPPER TRIAS**, in England succeeds the **BUNTER**, and is succeeded in turn by the **RILETIC**, which form the passage beds to the overlying **JURASSIC** formation. (*Keuper* is a German word, derivation unknown, pronounced *koyper*.) It consists of two divisions: the *Lower* or *Keuper Sandstone*, consisting mostly of red, white, and brown sandstone, with minor bands of marl; ripple marks are not uncommon, also some cracks and rain pittings, and the footprints of the labyrinthodont. At the base there is often a calcareous breccia or conglomerate. The *Upper* or *New Red Marl* consists mostly of shales and marls, with beds of rock-salt and gypsum. These contain the remains of a small bivalve crustacean, *Estheria minuta*, and of a lamellibranch, *Pullastra arenicola*. The Keuper is exposed over a large area in England. Commencing to the north at the mouth of the Tees, it extends south-eastward as a moderately broad band to the estuary of the Humber; from this its outcrop proceeds south-westward as a narrow band along the valley of the Trent to the Midland counties, where, expanding, it covers a large area, overlapping the Bunter in many places, and resting on Permian and Carboniferous rocks; it extends through Cheshire to the Mersey on the north, and sends a tongue-like prolongation south-westward to the mouth of the Severn and on across the South of England to the sea-coast of East Devon. Outlying patches occur in Scotland and Ireland, while probably it extends under much of the newer formation of the south-east of England.

Fossil remains are not abundant in the Keuper; besides those mentioned as occurring in the new red marl, some plant remains have been found of the genera *Voltzia* and *Walcchia*; these were probably cypress-like coniferous trees, and with them grew calamites, &c. Fish remains of several genera have also been found, the most noted being *Dipteronotus cyphus*; and besides the footprints of labyrinthodonts the bones of *Labyrinthodon gigantus* and of some other species have been found, as well as those of saurians. Teeth of the earliest known mammal, *Microlestes Antiquus*, have been found at Watchet in Somersetshire. In the outlying patch of Keuper that occurs at Brora in Sutherland, scutes and bones of *Stagenolepis Robertoni*, a crocodile, and the remains of a land lizard, *Telchipton Elginense*, have been found.

The economic products consist of rock-salt and building stone. The beds of rock salt occur mostly in the district between the mouth of the Mersey and the mouth of the Severn, ranging through Lancashire, Cheshire, and Worcestershire; they occur mostly in lenticular patches associated with gypsum. In Cheshire one bed is upwards of 100 feet thick; the rock-salt is cry-stalline, semi-transparent, or translucent; it is generally tinged yellow or red from the presence of ferric-oxide and clay. The salt is generally mined somewhat on the same principle as coal; in other cases the brine is pumped to the surface and the salt extracted by evaporation. In the north of Ireland there are extensive salt deposits, which are largely worked about Carrickfergus; the deepest salt-mine in the British Isles, which is about 900 feet, is worked in this district.

The pale red, brown, yellow, and white sandstones of the lower Keuper furnish excellent building stones; they are mostly fine-grained and easy to work, and many of them resist the atmosphere well. The cathedrals of Chester and Worcester afford good examples of their employment. At Alderney Edge in Cheshire there is a sandstone impregnated with carbonate of copper, which is treated with dilute acid and the dissolved copper precipitated by cementation on metallic iron.

It appears highly probable, from the phenomena of the Keuper formation and the dearth of fossil remains, that it accumulated in a large inland sea or salt lake, the concentration by evaporation of which produced the deposits of

gypsum and rock-salt; that although as a rule this lake had no outlet, yet it was sometimes subject to incursions of the sea, and eventually the conditions became altered to those in which the Rhætic beds were deposited which form a passage series to the Jurassic.

KEW, a village and parish of England, in the county of Surrey, on the south bank of the Thames, 6 miles west from Hyde Park Corner, and $9\frac{1}{2}$ miles from London by the South-western Railway, contains some good houses, mostly situated round a pleasant green. The church is a plain brick building of modern date. Gainsborough and Zoffany, the artists, are buried in the churchyard. In Kew Palace died Queen Charlotte. The famous Botanic Gardens at Kew are open daily. They were first established by the Princess-dowager of Wales about the middle of the last century, but owe their present unequalled attractions to the changes introduced into their administration in 1840, and the able superintendence of Sir William Hooker, whose son is the present curator. The principal buildings are—the Entrance Gateway, designed by Decimus Burton; the Aroidæous House; the Orangery, built by Sir William Chambers in 1761, now used as a museum for colonial woods; the Victoria House, containing the beautiful *Victoria regia*; the Palm House, 302 feet long and 66 feet high, built by Decimus Burton in 1848; a noble Temperate House, also built by Mr. Burton; the New Museum, devoted to products of dicotyledonous plants; the Tropical Aquarium; the Succulent House, 200 feet long and 39 feet wide; the Heath, Begonia, and Tropical Fern Houses; the Old Museum for monocotyledonous plants; the Orchidæaceous and Salicaceous Houses; in the Royal Pleasure Grounds, the ten-storied Pagoda, 163 feet high; the New Temperate House or Winter Garden, consisting of a centre, 212 feet by 137, and two wings, each 112 feet by 62, connected by two octagons, each 59 feet in diameter, making a total length of 582 feet; and the Observatory, in Richmond Old Park, erected by Sir William Chambers, and now belonging to the British Association. The gardens are 75 acres in extent, and the grounds 219 acres, and contain the finest collection of exotics in Europe. Steamers ply between Chelsea and Kew. The name of Kew seems to have begun only. Its name first occurs in a roll of the time of Henry VII., when it is called *Koyehough*, which would mean the wood or the park by the water. The population in 1881 was 1,770.

KEY, in music, has two senses—first, the assemblage of sounds, all connected with one another by certain mutual relations, in which a given piece of music is written; secondly, the levers which are required in playing many musical instruments, both those of the organ, piano-forte, harmonium, &c. (instruments which have what is technically called a keyboard), and those of the accordion, concertina, &c., whose keyboard is usually of quite another form, as well as those required in playing all brass instruments, except slide trumpets and trombones, and hand-orns, which have none, and all wooden orchestral instruments, except those smaller flutes and flutes which do not require them. But this second use of the word key, either in the sense of the French *tonche*, one lever of a keyboard (*clavier*), or in the sense of the French *clef*, one of the keys of a flute, clarinet, &c., needs no further explanation. It is the musical, and not the mechanical, sense of the word which demands attention.

A key, then, in modern music, is a certain collection of notes, at various definite intervals, which are reckoned from a fixed point called a tonic or keynote. This point may be taken at any pitch—that is, at any rate of vibration—but once fixed, it must remain unaltered during the piece of music. It is evident that one of the notes of the key other than the tonic may subsequently be taken as a keynote, and that the piece may “modulate,” as it is called, into this “related key,” and afterwards return to the

main key of the piece. In just intonation, while a key possesses some notes in common with each of the keys most nearly related to it, no two keys are *wholly* composed of the same notes, even when these notes bear the same names or are written by the same signs. For example, the key of C apparently differs from the key of G only in having an $F\sharp$ in the scale, where G has an $F\natural$; but really, upon instruments delicately and accurately tuned, or upon the voice or the slide trumpet, &c. (and of course by calculation also), the F, the A, and the C of the key of G are notes quite out of tune with the F, the A, and the D of the key of C. Still greater discrepancies occur with the key of D, where ordinary pianists would be led by their keyboard to consider that only two notes in the scale differed from the scale of C, and that the material of the two scales was the same, though diversely arranged. The fact is that exactly half the tone material of the key of D is made up of notes which have no existence in the key of C, and *vice versa*. If we go to the next key beyond D, following the usual order—namely, the key of A, we find ourselves in the position of that note being absolutely the only note common to it and the key of C. That is, given a key of C at any agreed pitch, containing, of course, an A as the sixth to the tonic, then the key which starts from that A as a keynote has (except the A itself) not one note which is not out of tune with the nearest note of the key of C, although the two discordant notes bear the same name in our rough musical speech. It is quite evident, therefore, that in nature keys are very sharply distinguished. But in actual practice the ear is so accommodating as to fit itself to a very great degree of divergency from truth; and in the article *TEMPERAMENT* it is shown that by tuning some of the intervals of a key falsely, yet not so falsely as to be beyond the limits of the good-will of the ear, several of the nearest related keys may be played upon the same keyboard. But the limitation of modulation was felt to be unbearable as music progressed in complexity, and the great Bach insisted that the further step should be taken, and every interval tuned falsely, with a definite stated falsity, whereby, though not one key was delicately in tune, every key would be sufficiently nearly in tune, and all keys could use the same materials. In other words, he insisted that any note, say D, for example, should serve for the note of that name in every key whatever, in spite of the two D's of the keys C and A differing, by a clearly recognized discordance, when absolute truth is demanded, as mentioned above.

The pianist, therefore, and the organist, with this *equal temperament*, can play the twelve separate keys or twelve notes to the octave, every note in one key serving for a note in another; but it must never be forgotten that this is merely a matter of accommodation, and that in actual truth a fresh instrument would be required for every fresh key.

This intentional and useful departure from the truth is now so intimately interwoven with our musical habits, that it becomes yearly more difficult to make it understood as a falsity. Musicians of fine organization begin to complain that violinists and singers, who have the power of using really just intonation, are habitually using equal temperament instead; for their ears have grown corrupt, and the universal use of the pianoforte, with its every note a little out of tune, threatens thus to change the very material of music. The remedy lies in the occasional use of instruments accurately tuned in some one key, so that the "innocence of the ear" shall be preserved.

The materials of a key are twelve notes at accurately defined intervals. The keynote being fixed, at whatever pitch we choose to set it, its major Second and Third, its perfect Fourth and Fifth, and its major Sixth and Seventh are taken to form its *major scale*, and these intervals are measured according to their several ratios described in the article *INTERVAL*. To the major scale

are added the minor Second, Third, Sixth, and Seventh, and the augmented Fourth [see *INTERVAL*], and the whole twelve notes thus obtained are called a *chromatic scale* when they are arranged regularly according to the magnitude of their intervals, or a *key* when they are regarded not as a succession of notes, but as a mass for use in any order or selection preferred. A scale, then, is the notes or part of the notes of a key set in a given melodic order. It may be added, to complete the view of the scale in a key, that, besides the *major scale* of seven notes (or eight notes, if the octave to the keynote be added), there is the *minor scale* of a like number, differing from the first only in having a minor Third and a minor Sixth in the place of a major Third and a major Sixth.

Now if all the twelve intervals of the chromatic scale (which are called *semitones*) were tuned at an equal ratio in one key, then it is quite manifest that equal temperament is obtained. For if it is as far between 1 and 2 as it is between 2 and 3, and between 3 and 4, and so on, it is abundantly evident that we shall get an exactly similar series of intervals (that is, an exactly similar key) whether we begin at 1 or at 4, or at any other point. This is the theory of equal temperament and of the modern pianoforte keyboard, and from that it has passed into the inmost construction of the usual method of musical notation.

We have to assume in what follows that we are dealing with the ordinary equally-tempered intonation. Then we find that, taking the white notes of a pianoforte and starting at C, we have a perfect major scale of seven notes without using any of the black notes. If we require to use more notes of the key than are contained in the major scale we express them by b or \sharp , the b indicating the next black note on the bass side, the \sharp the next black note on the treble side of the note of the major scale which is to be inflected. In this way we indicate the importance of the major scale, and are able to do with seven notes in a key instead of twelve, which is certainly a convenience. The effect of the b as used in the key of C being to indicate a black note a semitone below, and that of the \sharp a black note a semitone above the uninflected white note, this value is taken in all cases, and the amount of inflection is fixed at a semitone whether the result of the inflection is to indicate a black note or a white one. For instance, $E\flat$ is a black note, $E\sharp$ a white one.

Now, setting out the major scale of C in letters, and putting a $+$ to indicate a black note, it runs thus:

$$C + D + E\flat + G + A + B\flat C.$$

Here we distinguish in our scale (which runs along the letters, to the exclusion of the crosses or black notes) the major Second with its two semitones $C + D$, the major Third with its four semitones $C + D + E$, and so on, as directed in the table of *INTERVALS*, up to the major Seventh with its eleven semitones, or (as it may be more easily written) with its one semitone *beneath* the octave, B C. Now if we extend the series of letters, and start from G as our keynote, we find we can get a good major scale of white notes until we come to the Seventh of the new scale—

$$G + A + B\flat C + D + E\flat F + G.$$

Here F is two semitones below the upper G—viz., $F + G$, and is therefore but ten from the keynote. Clearly the remedy is to raise F by a sharp to $F\sharp$.

The keynote G was a perfect Fifth above C. If we again take a skip of a perfect Fifth and take the resultant D as a new keynote, we shall find that besides the $F\sharp$ (which is here still required to give us a major Third) we now need a $C\sharp$ to provide us with a major Seventh.

Another rise of a perfect Fifth gives us A as a keynote—

$$A + B\flat C + D + E\flat F + G + A.$$

A glance at the series of letters shows that besides re-

taining the $F\sharp$ (here wanted to give a major Sixth) and the $C\sharp$ (wanted for the major Third) we need a fresh black note—namely, $G\sharp$, to provide us with a Seventh.

It therefore appears that as the keynotes rise a perfect Fifth they need one additional sharp, and that that sharp is always the Seventh of the key. The series may be thus put:—
Sharp Keys (rising by Fifths).

- C —all naturals.
 1. G — $F\sharp$
 2. D — $F\sharp$ $C\sharp$
 3. A — $F\sharp$ $C\sharp$ $G\sharp$
 4. E — $F\sharp$ $C\sharp$ $G\sharp$ $D\sharp$
 5. B — $F\sharp$ $C\sharp$ $G\sharp$ $D\sharp$ $A\sharp$
 6. $F\sharp$ — $F\sharp$ $C\sharp$ $G\sharp$ $D\sharp$ $A\sharp$ $E\sharp$
 7. $C\sharp$ — $F\sharp$ $C\sharp$ $G\sharp$ $D\sharp$ $A\sharp$ $E\sharp$ $B\sharp$

The last key is very rarely used. Its notes on the pianoforte are identical with those of the very usual $D\flat$ (five flats).

When a piece is written chiefly in the notes of the minor scale from the keynote, it is said to be in a minor key, and the notes requiring inflection differ. In sharp keys a minor key takes three less sharps than the major from the same tonic. Thus A minor takes no sharps in its signature, and this although $G\sharp$ is plainly required for the Seventh. It is very curious that this custom should have arisen, but it is invariable, and the necessary inflection for the Seventh is always omitted from minor signatures of every kind, and is inserted in the body of the music as it occurs. The following is a general list of *minor keys* (*sharps*):—A has no sharps, E has one, B two, $F\sharp$ three, $C\sharp$ four. It is observed, of course, that the collection of sharps, or *key-signature*, is the same for a minor key as for the major key which is at the distance of a minor Third (three semitones) above it. Thus E minor has the same signature as G major (one sharp, $F\sharp$).

Now if, starting from C, we *descend* by Fifths instead of ascending, what will happen? Our first keynote is F. On looking at the written series—

F + G + A + B C + D + E F

we see that the notes of the scale of C will serve to give us the proper series of intervals for the major scale, all except the note B, which is a semitone too high to yield a perfect Fourth from the keynote F. We must therefore use $B\flat$. Again descending a Fifth for a new keynote we come to $B\flat$, and if we start from $B\flat$ as a tonic we shall require $F\flat$ to give us a Fourth, E being a semitone too high. Our next keynote, still descending by Fifths, is $E\flat$, and while $B\flat$ is retained to give us a perfect Fifth, $A\flat$ becomes necessary for our perfect Fourth.

Whence it becomes evident that as the keynotes fall a perfect Fifth one additional flat is needed, and that this additional flat is always needed for the Fourth of the new key. Further, each added flat is the next following keynote in the descending succession of Fifths. Thus $B\flat$ is added in the key of F, and is the keynote of the *next* key; $E\flat$ is added in the key of $B\flat$, and is the keynote of the *next* key. In the same way, therefore, that we can tell a key from a *sharp* signature by the keynote being the next note above the *last sharp* of the signature, so in a *flat* signature the keynote is indicated as being the *last flat but one* in that signature. The whole succession may be shown thus:—

Flat Keys (falling by Fifths).

- C —all naturals.
 1. F — $B\flat$
 2. $B\flat$ — $B\flat$ $E\flat$
 3. $E\flat$ — $B\flat$ $E\flat$ $A\flat$
 4. $A\flat$ — $B\flat$ $E\flat$ $A\flat$ $D\flat$
 5. $D\flat$ — $B\flat$ $E\flat$ $A\flat$ $D\flat$ $G\flat$
 6. $G\flat$ — $B\flat$ $E\flat$ $A\flat$ $D\flat$ $G\flat$ $C\flat$
 7. $C\flat$ — $B\flat$ $E\flat$ $A\flat$ $D\flat$ $G\flat$ $C\flat$ $F\flat$

The last key is rarely used. It is observed to be identical in performance with the key of B (five sharps), which is accordingly used in its place. The key of $G\flat$, with its six flats, is likewise identical with that of $F\sharp$, with its six sharps; probably $G\flat$ is the more usual way of writing it.

As with the minor sharp keys so with the minor flat keys, but in the reverse sense; they have three flats more than the major keys on the same keynote. If a major key has three sharps, as the key of A, these are neutralized; if it has two, as the key of D, these are neutralized, and the minor has one flat; if it has one, as the key of G, this is neutralized, and there are two flats left over for the signature of G minor.) The following is a table of *minor keys* (*flat*):—A has no flats, D has one, G two, C three, F four, $B\flat$ five. It is seen as before that each minor key has the same key-signature as the major key three semitones above it. Thus G minor has the same signature as $B\flat$ major (two flats, $B\flat$, $E\flat$).

Musical Effect of Keys.—That composers have very firm opinions on the different musical effect of contiguous keys is as certain a fact as it is that they are deceived therein (at least so far as regards the voice, pianoforte, or organ). That music in $D\flat$ could be different from music in C is not very likely, first, because it would be only too possible that two instruments should be half a tone apart in pitch, and yet that when heard separately the musical effect should be indistinguishable; and secondly, because if one voice or instrument had a more piercing tone than another, the mental effect would be probably, *ceteris paribus*, so much more stirring as to produce the effect of a higher pitch. Nothing is more common than for a thin soprano voice to be thought to be singing notes a third above, or a heavy bass voice notes a third below, their actual value when tested. Of course there is probably some little distinction, arising from the varying shape of the hand and direction and force of the blow upon the pianoforte according as the key lies much among the black or the white notes. And also, when keys are separated by a Third or a Fourth, the difference becomes marked in every way. Probably the secret of the persistence of composers in this notion of the varying musical force of keys lies in the fact that there is a real and very marked difference on the orchestra. Thus the tone of the clarionets used for flat keys is quite distinct from those used for sharp key; the great violin family all get open strings, and therefore great resonance, in the keys of C, G, D, A (and for the violas F also); the horns vary most perceptibly as the key is altered, &c. With the well-known readiness of the ear to hear what was intended, instead of merely what actually sounds, this will doubtless account for the circumstance of musicians "reading into" the tones of the pianoforte, &c., differences which they know to exist elsewhere.

KEY (or KI) ISLANDS are a group of considerable extent in the Indian Archipelago, situated between $5^{\circ} 20'$ and $6^{\circ} 30'$ S. lat., and between $132^{\circ} 30'$ and $133^{\circ} 40'$ E. lon. Three islands are rather large, and called Great Key, Little Key, and Key Watela. The number of the smaller ones is not known, as they are rarely visited by Europeans. The population is from 18,000 to 20,000, many of whom are Mohammedans. The Great Key is about 45 miles in length. The three larger islands rise to a moderate elevation above the sea, and all the heights are overgrown with forest trees, which constitute one of the principal sources of wealth to the inhabitants, who are engaged in building native boats or *proas*, and in pottery manufacture to a considerable extent.

KEY WEST, an island of the United States, is the most westerly of the Pine Islands in the Gulf of Mexico, 60 miles west of Cape Sable, Florida. It is about 7 miles long and 2 miles broad, of coralline formation, and raised 20 feet above the sea-level. On the south-west point there is a light 83 feet above the sea-level. The island is

strongly fortified, and is considered as the key to the Gulf of Mexico, as Gibraltar is to the Mediterranean.

KEY WEST, the capital of Monroe county, situated on the above island, is a flourishing town with the finest harbour in the United States south of the Chesapeake, the depth of water being 22 feet. It is resorted to as a sanitarium, and has a large trade in salt and sponges, and a prosperous manufacture of cigars. Many of the inhabitants are employed in salvage work in connection with the dangerous Florida reef. The chief buildings are the naval offices, masonic hall, an opera-house. Population, 6000.

KEY BOARD, the well-known arrangement of keys or levers covered with ivory (natural-) and separated by keys bearing raised slabs of ebony (sharps), used for pianofortes, organs, harmoniums, &c. Formerly the arrangement of colours was often reversed. Many if not most of the old spinets had ebony "naturals" and boxwood "sharps." About 1875 a preparation of compressed vegetable substances was produced which, under the name of *celluloid*, replaced ivory with some advantage. It can of course be made in any size and tint, needs no joints, does not discolour with exposure or under the perspiration of the hand, and is much cheaper. On the other hand it does not bear the beautiful surface polish of ivory, nor the fine grain, nor is it so hard. Unless ivory becomes cheaper (which is scarcely probable) celluloid or some other substitute will certainly continue to be used.

The well-known arrangement of the pianoforte keyboard is thus, indicating the black notes by crosses:—

C + D + E F + G + A B C, &c.

This necessitates a fresh fingering, or at all events a fresh position for the hand, for every key. A society exists in Germany for the promotion of a keyboard which shall be alike for all keys, and the black and white notes of which are evenly distributed thus:—

(Black) C D E F + G + A + B C
(White) + + + + +

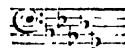
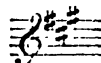
They also reconstruct the staff for this new keyboard, and in writing music use the ledger lines above and below the staff for C, and the five lines of the staff for the rest of the black or upper row, while the four spaces between the lines of the staff, together with the two positions immediately outside the staff, above and below, give room for the six notes of the lower or white row. The pitch of the staff used is indicated by a suitable sign, a necessary precaution, since all staves would be alike on this system, and clefs would have no existence. It is hardly likely, however, that the old keyboard will be superseded, with its easily recognizable groups of black notes and its long familiarity.

KEY HOLE LIMPET (*Fissurellidae*), a family of *GASTROPODA*, nearly allied to the true limpets (*Litel-*

symmetrically on either side of the anus. The renal organs are paired; the heart has two auricles. The foot is a broad creeping disc. The head is well developed, bearing conical tentacles having eyes on rudimentary stalks at their outer bases. The margin of the mantle is slit or fissured in front, the free edges forming a siphon, which occupies the anterior notch or perforated apex of the shell. The shell is symmetrical, conical, limpet-shaped, with a recurved apex. It is either grooved or fissured at its anterior margin, or perforated at the apex. The aperture is wide, and not pearly within; there is no operculum. The species are very numerous, and are generally littoral in their habits and vegetable feeders. The typical genus *Fissurella* has the apex of its shell perforated by a hole greatly resembling that of an ordinary keyhole. The species are numerous, and distributed over nearly the whole surface of the globe. Other genera are *Emarginula* and *Parnophorus*.

KEYNOTE, in music. See **KEY**.

KEY-SIGNATURE, the collection of sharps or flats which are required to form a key in the usual manner [see **KEY**], and which are collected together and written in the proper order (of ascending or descending Fifths respectively), at the beginning of every staff immediately after the clef:—



Key-signature of A major. Key-signature of D major.

KHAM'SIN, the name of a hot south wind or blast which begins to blow in Egypt soon after the vernal equinox. It continues at intervals for a period of about fifty days, as the term implies, and is somewhat similar in its destructive effects to the simoom, or sirocco, so prevalent in the desert regions of the East.

KHAN, a word of Mongolian origin, said to mean "great and powerful lord," was employed by the nations of Central Asia to express supreme authority. It was assumed by GENGIS when he became supreme ruler of the Mongols and Tartars, and was adopted by all his successors. The earlier rulers of the Ottoman Empire also used this title, and it is still used in Central Asia to designate the governors of provinces or *khanates*. In old English writers the title is spelt *Cham*, the "great Cham" being a somewhat mythical governor of Tartary.

Khan is also a Persian word for a public lodging-place for travellers, and in this sense it is largely used in Syria and some other countries in the East. Dr. Kitto's description of a khan is as follows:—"A khan, then, usually presents externally the appearance of a square, formed by strong and lofty walls, with a high and often handsome gateway, which offers an entrance to the interior. On passing through this the traveller finds himself in a large open quadrangle, surrounded on all sides by a number of distinct recesses, the back walls of which contain doors leading to the small cells or rooms which afford to travellers the accommodation they require. Besides these private apartments, there is usually in the centre of one or more of the sides of the quadrangle a large and lofty hall, where the principal persons may meet for conversation and entertainment. The floors of all these apartments are raised 2 or 3 feet above the level of the court they surround, and in the centre of the court is a well or cistern." In Syria the keeper of one of these inns is termed the *khanji*. The slang term *ken*, a house, is probably derived from khan. See also **CARAVANSERAI**.

KHARKOFF or **CHARKOV**, a government of European Russia, bounded N. by Koursk, E. by Voronezh, S. by Ekaterinoslaw, and W. by Poltava. The area is about 21,000 square miles, and the population 2,071,000. This, like the other governments of Little Russia, has a flat monotonous surface, and a very fertile soil. The principal

Fissurella crassa.

lidæ). The keyhole limpets agree with the limpets and earshells in retaining traces of the primitive bilateral symmetry. The gills are a pair of large plumose organs placed

rivers are the Donetz, Orkol, and Vorskla; but none of them are navigable, at least for any considerable distance. All sorts of corn are raised. Flax and hemp, tobacco, and hops are also raised, and the potato is extensively grown. The cattle are excellent; there are few peasants without bees. There is considerable industrial activity. Sugar-making, cotton, wool, and iron-working and tanning are the chief industries.

KHARKOFF or **CHARKOV**, a town of Russia, capital of the above government, is situated in the fork between the Kharkoff and the Lopan, whose united waters run into the Donetz. It has a university, connected with which is a botanic garden, a collection of natural history, an observatory, and a library of nearly 100,000 volumes. The town is the capital of a Greek eparchy, and the usual residence of the bishops of the Ukraine and Kharkoff. It is 916 miles from St. Petersburg, and 462 S.S.W. from Moscow, and its position between Moscow, Kieff, Taganrog, and the Caucasus has made it the seat of a considerable commerce between the north and south of Russia. Four great fairs are held annually, one of which is chiefly for wool; at the others vast quantities of manufactured goods and other merchandise are sold, the transactions at all the fairs being estimated to amount to £10,000,000 per annum. The manufactures include articles of Cossack clothing, excellent carpets, felt cloaks, soap, candles, and leather. There are altogether about eighty factories, and there is a government model farm in the neighbourhood. The population of the city is about 100,000, it having considerably increased of late years.

KHARTOUM, the chief town of the Soudan, founded in 1820 by Mohammed Ali, is 95 miles south-west of Shendy, and stands in 15° 37' N. lat., and 22° 51' E. lon. It occupies a triangular point of ground formed by the confluence of the clear silvery flood of the White Nile, with the dark mud-laden stream of the Blue Nile, the true source of the fertilization of Egypt. Seen from a distance the groves of green waving palm-trees which adorn the entire front at intervals, abounding in heaviest luxuriance at the two extremities, give the town an air of richness and fertility which a closer acquaintance fails to confirm. Under the rule of Ismail Pasha vast improvements were effected in the buildings of the town, and the architectural pretensions of the public offices and ordinary dwellings erected formed a strong contrast to those which they superseded. Facing the Blue Nile on its western bank a large, square, handsome mansion was built as a palace for the governor-general, and a large garden was inclosed in the rear, abounding in date palms and lemon-trees, with many plants that had been introduced from Europe. An arsenal, the treasury, and a long range of houses occupied by merchants and store-keepers lined the terrace along the river, but most of the houses inhabited by the natives were merely mud-huts of the same description as the majority of the houses of Egypt. Being entirely deficient in natural or artificial drainage the town is at certain seasons of the year a hot-bed for fever, and the rate of mortality, which is not specially high during the winter and spring, increases with fatal certainty after the first rainfalls in July. Dysentery is also very common, and Europeans are often attacked by an irritating affection of the skin called the Nile Water rash, while insect plagues of all descriptions abound. As the centre of the chief caravan routes from the interior of Africa, and also for a long time one of the centres of the slave trade, it was a place of extensive commerce, and large fortunes were amassed by its merchants. Unhappily it was also the chief centre for the exercise of the rapacity and cruelty of the Egyptian governors of the Soudan, under whose blighting influence the whole of the surrounding country suffered. It was the object of these men to squeeze a fortune out of the natives in as short a time as possible, and the methods they adopted were extortion

carried out by means of the bastinado, open robbery, and wholesale murder. A graphic description of the horrors of this rule may be found in the letters which were written from Khartoum in 1883-84 by Mr. Frank Power, the able and courageous correspondent of the *Times* (London, 1885).

Khartoum will ever be memorable in British history for the gallant defence carried out by General Gordon in 1884-85, and for its being the scene of his death in the latter year. After enduring intense suffering for many years the Soudanese found a leader in the person of the "Mahdi" Mohammed Ahmed, whose successes in the year 1883 placed the Egyptian officials and civil population in great peril. Under pressure from the British government Egypt consented to withdraw from the Soudan, but great difficulty was experienced in removing the Egyptian inhabitants. At the invitation of the British government General Gordon left London for Khartoum 18th January, 1884, and on the 18th February—exactly one month afterwards—he entered the city accompanied by Colonel Stewart, and was received with wonderful demonstrations of welcome on the part of the population. At first it appeared as though he would be able to execute without great difficulty the task intrusted to him, but soon afterwards it became evident that the obstacles in the way were almost insuperable. In his messages to Cairo he repeatedly expressed his conviction that unless the Mahdi was defeated an evacuation of the Soudan was impossible, and he appealed for the means of undertaking the task. This view did not commend itself to the British government, and his various proposals were deemed unacceptable, with the result that the tide of insurrection rose and surged round Khartoum so that by the middle of April it was wholly cut off from communication with the outer world. Thus left alone Gordon vigorously set about the defence of the city, and assisted by Colonel Stewart, Mr. Power, and a few faithful Mohammedan supporters, he successfully withstood the efforts of the besiegers until the end of January, 1885. So skillfully did he organize the defence that at one time he was master of the Nile for about 360 miles, and every assault was repelled with heavy loss to the attacking party. This he accomplished although the whole commanded were for the most part helpless cowards, who would fight only under cover, and who ran like sheep when they were attacked in the open. In the middle of September, 1884, he lost his brave European companions, who were treacherously murdered near Wady Gura, and then he held out alone until 26th or 27th January. The British government meanwhile had dispatched an expedition up the Nile for the deliverance of the city and of the heroic governor. Lord Welsley was in command, and as he ascended the river pushed forward a detached portion of the expedition across the desert; but just when this part of the army of deliverance was within a few days of reaching it, the city was treacherously surrendered to the followers of the Mahdi, and Gordon was killed in its streets. With the death of Gordon one of the chief reasons for the British expedition disappeared, but as it seemed probable that the possession of Khartoum would greatly increase the power and influence of the Mahdi, and enable him to menace Egypt, the first resolution of the British government was to continue the advance and recover the city. Owing to the weather the movement up the Nile was discontinued, but additional troops—British, Indian, and colonial—were landed at Suddum, and preparations were made for the construction of a railway from Snakim to Beher. Soon afterwards the news arrived that a rival Mahdi had appeared by whom the troops of Mohammed Ahmed had been severely defeated, and as at the same time serious political complications had arisen in connection with the advance of Russia towards India, the Soudan expedition was countermanded, and no further advance was made towards Khartoum.

KHAY'A, a genus of plants of the **CEORELEÆ**, which is a tribe of the **MELIACEÆ**. Khaya contains only a single species, *Khaya senegalensis*. It forms one of the largest and handsomest of the trees which are found along the banks of the Gambia and in the valleys near Cape Verd. It is valuable for its wood, which is like mahogany, and medicinally for its febrifugal bark. The parts of its flowers are in fours, and its fruit splits from above downwards.

KHED'IVE (Persian *khidir*, a sovereign), the official title of the governor of Egypt. It was first granted by the sultan to Ismail, the son of Ibrahim Pasha, in 1867, in the place of that of *Vali* or viceroy.

KHELAT' (*Kalat*), the chief town of the territories of the Khan of Khelat in Baluchistan, is situated on the northern spur of a limestone hill called the Shah Mirdan, in 28° 53' N. lat., 66° 28' E. lon. It is about 6800 feet above sea-level, and has in consequence a temperate climate, approximating to places situated in much higher latitudes. Khelat is a fortified town built in terraces, and has three gates, known as the Khani, Mastung, and Belai—the two latter named, no doubt, from the roads leading to Mastung and Bela, which pass through them. The streets are extremely narrow, tortuous, and dirty. The walls are built of mud, with bastions at intervals; and both walls and bastions are said to be pierced with numerous loopholes for musketry. Only a few guns are mounted on them. The *bazar* of Khelat is large and well supplied with all kinds of necessaries, and the town itself is furnished with very clear and pure water from a stream which rises in the base of a limestone hill on the eastern side of the valley. The *dar*, or old fort, now forms the palace of the khan, and overhangs the town. It consists of a confused mass of buildings closely crowded together. Cook says it is an imposing and antique structure, and probably the most ancient edifice in Baluchistan, owing its foundation to the Hindus who preceded the present Mohammedan dynasty. The number of houses, according to the latest authority (Bellamy), is said to be 3500, which would imply a population of about 14,000 persons. The Brahmins form the great bulk of the inhabitants, but the cultivation is chiefly carried on by the Dehwar communities. There are several villages and walled gardens clustered together in the valley east of the town.

KHERSON' or **CHERSON**, a government of European Russia, bounded N. by Podolia, Kieff, and Pultawa, E. by Ekaterinoslaf, S. by Taurida and the Black Sea, and W. by Bessarabia. Its area is 27,713 square miles, and its population 1,700,000. Its length from east to west is 240 miles, and its average breadth from north to south is about 140. The province, which consists of an immense plain, lies between the Dnieper and the Dniester, which respectively bound it on the east and west. The central parts are drained by the Bug, the Ingul, the Inguletz (a feeder of the Dnieper), and by several smaller streams. The north of the country is diversified by some hills, which are covered with forests. The rest is a treeless steppe overgrown with tall grass, which the great heat of summer withers; vegetation does not revive till the autumn. In the interior the soil is a gray clay mixed with sand, which produces no pasture. Here and there are heaths, and in the lower parts swamps; on the coast there is a red ferruginous earth, which produces little besides saline plants. There is a great scarcity of spring water in the steppes. The climate is very variable; in summer the heat is from 85° to 90° Fahr. A dark yellow sky, a wind which raises the dust in clouds, and an immense torrent of rain, are the usual precursors of a thunderstorm, which is awful beyond conception. The nights are always cool. The winter is cold; most of the rivers freeze over, though but for a short time. Agriculture is in a backward state; the breeding of cattle and sheep is the chief occupation of the population. Corn, hemp, flax, tobacco, liquorice, saffron, and mustard are

grown. The vine is cultivated, and much attention is paid to horticulture. Oxen and buffaloes are numerous, and used for draught; the horses (of which many are wild) are slight, but very spirited and swift-footed; the breed of sheep has been much improved by crossing the common stock with merinos. Wolves, wild cats, bustards, gray partridges, ortolans, snipes, &c., abound; the country is infested by locusts, large rats, snakes, scolopendræ, lizards, and swarms of gnats. The fisheries on the sea-coasts and in the rivers are important. The minerals are—fine potter's clay, freestone, slate, chalk, talc, saltpetre, agates, and garnets. The province is well situated for trade. The foreign commerce of the country is very important and rapidly increasing. Manufactures of cloth, tallow, leather, butter, cheese, and caviare are carried on, partly by Swedish, German, and other colonists, the population consisting of a great intermixture of races.

KHERSON, the capital of the above government, a large, well-built, fortified town, with 40,000 inhabitants, is situated on the right bank and near the mouth of the Dnieper, which forms a good harbour. It is the seat of the governor of the province, and was formerly important on account of its great naval dockyards, arsenal, and foreign trade. But unhealthiness of site and the difficulty experienced by large vessels in crossing the bar at the entrance to the harbour have greatly contributed to its decline in favour of Odessa, although a good trade is still carried on in linseed, wheat, ropes, tallow, and wool, the exports amounting to about £1,000,000 annually. Three miles distant are the tomb and cenotaph of Howard the philanthropist (erected by Alexander I.), who died here in 1790.

KHI'VA or **KHYVA**, a country of Eastern Turkestan, on the east of the Caspian Sea, extends from 37° 45' to 41° 30' N. lat., and from 50° 30' to 63° E. lon. The population numbers in all about 700,000, and consists chiefly of Uzbeks, or Turk Tartars; Tadjiks, of Persian origin; and Persians, who form the most industrious part of the population. Besides these races, who mostly follow agricultural pursuits, there are numerous nomad tribes, principally Karakalpaks, Khlirgese, and Turcomans. The surface of the country is almost entirely a sandy desert, but along the banks of the Oxus (which flows through the eastern side) and the canals connected with it, there are many fertile tracts. In these places the vine is cultivated, and wheat, millet, barley, abundance of excellent fruits, linseed, cotton, flax, and some rice, are grown. The breed of horses is good, and sheep and goats abound. Camels are the ordinary beasts of burden. About 2000 of them go annually to Orenburg, Astrakhan, and Cabul with agricultural produce, silk and cotton fabrics, and yarn, to be exchanged for the products of Russia and the West, which are brought in boats across the Caspian Sea. Some shawls are made by the females and exported; but agriculture is the principal occupation of the settled inhabitants, and is in a very advanced state.

So far back as 1703 Khiva acknowledged a nominal submission to Russia, whose Asian territory it adjoined. In reality, however, the country maintained its independence, and this would probably have been respected by Russia but that the khans, relying on the supposed inaccessibility of their country, encouraged lawless raids into Russian territory, wholesale robberies of Russian merchants and traders, and kidnappings of Russian subjects. To stop such proceedings an expedition was despatched in 1715 under Prince Bekovich Cheikasski, but the prince was thrown off his guard and easily overcome by the khan, and the robberies and kidnappings then went on for more than a century. In 1839, after vast preparations had been made, another expedition started under the Russian General Perovski. The season, however, was ill chosen, and in spite of every care the result was a disastrous retreat; many of the troops

and camels succumbed to the rigours of the journey and weather, and the remainder were scarcely a match for the warlike Turcoman forces of the khan. The provocation then continued, aggravated by the belief in the impossibility of any Russian force ever being able to cross the arid steppes of the Central Asian desert. This illusion, however, was dispelled in 1873, when the conquest of Khiva was successfully accomplished by a large force under General Kauffmann, which moved upon the khanate by several roads, all converging at the capital. Immense difficulties were encountered by the army in the alternate cold and heat of the great desert and the scarcity of water, but the Khivan troops scarcely attempted resistance. Khiva was occupied, the khan surrendering and submitting to become the vassal of the czar, but the country still maintains a nominal independence. A war contribution of 2,200,000 roubles was exacted, all Khivan territory on the right bank of the Oxus incorporated with the Russian Empire, slavery was abolished, and the country was thrown open to unmolesated trade. The villages and towns generally consist of mud huts, disposed in irregular, dirty streets, surrounded by ruined walls, and outside these by gardens and fields.

KHIVA, the capital of the above country, is situated in an irrigated plain near the Oxus. It is protected by a clay wall, about 5 miles in circumference and 10 feet high. Within this wall there is another about 3 miles in circumference and 22 feet high, the lower portion being 28 feet thick. The interior wall protects the palaces of the khan and the more important buildings of the city. The space between the inner and outer walls is to a great extent planted with gardens, and includes the khan's summer palace. The streets are broad and clean, and there are many handsome houses built of polished bricks, with coloured tiles. The palace of the khan is a large handsome building, ornamented with pillars and domes covered with shining tiles, which are used in the domes of the public schools, mosques, and other buildings, and give the city a bright pleasing look. The whole town has 20,000 inhabitants, seventeen mosques, 300 shops, and twenty-two ecclesiastical schools, and is the chief seat of trade.

KHOKAN', KHOKAND', or FERGHANA', a country of Central Asia, between 40° and 45° N. lat., 67° and 75° E. lon., bounded by Chinese Turkestan, South Bokhara, &c. The surface is mountainous, pasturage plentiful, live stock numerous, and wool is an important article of export. The products comprise corn, cotton, silk, and fine fruits, including the apricot, apple, pear, almond, and melon, with coal, copper, iron, &c. The chief articles of manufacture are embroidered silks, cotton stuffs, cochineal, and sandal-wood. Shawls are imported from Cashmere and Balkh, the rest of the trade being chiefly with Budakshan and Russia. The principal towns are Khokan, Khojend, and Tashkend. Population estimated at about 900,000.

Russia, which had for years been encroaching upon the khanate, formally annexed to her dominions in 1875 the whole of Khokan to the north of the Syr Daria (Jaxartes). In 1876 the whole of Khokan was by imperial decree converted into the Russian "Ferghana province" of Turkestan. The conquest, however, was not completed without great bloodshed, owing to the desperate resistance of the native tribe of Kipchaks, or Kara-Khingese. Besides giving birth to Baber, the conqueror of Hindustan, who ascended the throne of Ferghana in 1494, Khokan and its vicinity abound with localities intimately connected with the history of Genghis Khan and Timur.

KHOKAN, formerly the capital of the above country, but under the Russians, owing to the prevalence of goitre, no longer the centre of government, is well built, and contains the palace of the former khan, many mosques, public schools of Mohammedan learning, bazaars, &c., and is a place of active trade. Cotton and grain crops are grown;

but grain is chiefly supplied from the fertile Namangan district further east, where the valley widens; and the vicinity of the city is chiefly laid out in fruit gardens, the soil, naturally barren, being rendered fertile by irrigation.

KHORASAN, a province of Persia, extending from 31° to 38° N. lat. and from 53° to 61° E. lon., bounded on the north by the khanate of Khiva, on the east by Afghanistan, on the south by Faristan and Kerman, and on the west by Irak-Ajemi. Its boundaries, however, have been very different at different times; and its present area, which is small comparatively with the great extent of country that it comprised prior to the invasion of the Afghans, is roughly estimated at about 150,000 square miles. Its surface is much diversified by plains and mountains; a large portion consists of arid rocks, destitute of vegetation or fresh water, and of salt and sandy deserts, among which may be found a few fertile oases. The Elburz range of mountains crosses the north part of the province eastward, and between this lofty ridge and the Caspian Sea is an immense uninterrupted plain, which includes the steppe of Khiva. Of the rivers of Khorasan, the Tedzen (ancient *Ochus*) is next in size to the Oxus; it appears to rise near Seraks, and after receiving the Meshed and other streams, falls into the Caspian Sea in lat. 38° 41' N. The rivers of the interior are few and inconsiderable, and for the most part are lost in the sand, like the Zenderoon of Ispahan. A great portion of the country is a vast, sandy, salt desert, occupying more than 40,000 square miles, called by the natives Kubeer. The districts of Astrabad and Meshed are, however, very fertile. There are manufactures of silk and woollen goods, carpets, muskets, &c. There are also turquoise and salt mines. Chief produce, wheat, rice, cotton, hemp, tobacco, and asafoetida. The inhabitants are Tadjiks, Turcomans, and Koords. Khorasan signifies the "land of the sun."

KHYBER PASS. See AFGHANISTAN.

KIACH TA, a frontier town of Russia in the Siberian government of Trans-Baikal, situated in a sterile country, 2480 feet above the level of the sea, on a small stream also called the Kiachta, 180 miles south-east of Irkutsk. It is defended by the fort of Troitzkosavsk, and has a population of about 5000. The upper town is well built, and contains the governmental and public buildings. The lower town is chiefly occupied by traders. The commerce of this place with Maimaitchin, the Chinese emporium, which is less than a mile distant, has risen to great importance in modern times; but since the opening of the Chinese ports to commerce in 1860 its importance has somewhat decreased. The trade consists in the exchange of Russian and other European manufactures, furs, lamb-skins, cattle, and bullion, for tea, silk, nankeens, porcelain, rhubarb, and other Chinese produce. A vast quantity of the finest tea passes out by this route.

KIANG (*Equus hemionus*) or Wild Ass of Tibet, is a member of the family EQUIDÆ, dwelling in tents on the high plateaus of Tibet, at an altitude of from 15,000 to 16,000 feet above the sea. The kiang is a fine animal, standing as much as 14 hands high at the shoulder. It is swift in its movements and difficult of approach; it neighs like a horse. The ears are of moderate length, the hair is smooth and of a bright rufous-bay tint, the legs having a pale straw colour. A dark broad streak runs along the central line of the back, but it is not crossed by any similar band over the shoulders. The first kiang seen in Europe was brought to the gardens of the London Zoological Society in 1859.

KIDDERMINSTER, a market-town and municipal borough of England, in the county of and 15 miles N. by W. from Worcester, and 134 from London by the Midland Railway, is situated on both sides of the Stour, near its confluence with the Severn, and the Worcester and Stafford Canal also passes through it. The town stands on a hill,

is irregularly but now generally well built and paved, and supplied with abundance of good water. The chief buildings are St. Mary's Church, a large and venerable structure on the hill; several other churches; numerous places of worship for dissenters; free grammar-school; corn exchange, including a public hall, school of art, the town free library, and a public newsroom; town-hall, erected in 1877, infirmary, and almshouses; and the usual public and commercial buildings of an industrial town. A handsome statue to Richard Baxter, the author of the "Saints' Rest," was erected in 1875, and another to Sir Rowland Hill, who was a native of the town, in 1881. Cattle and vegetable markets, covering 2 acres of ground, were opened in 1872. Kidderminster was noted for its woollen manufactures in the reign of Henry VIII.; but for many years past it has been chiefly celebrated for its carpets. Wool-spinning, and the manufacture of tapestry, rugs, and fancy goods for upholsterers, are also carried on in the town. The Worcester and Stafford Canal affords water communication with Liverpool, Hull, and Bristol. The municipal borough of Kidderminster is divided into two wards, and governed by six aldermen and eighteen councillors. The population in 1881 was 12,743. Some of the houses are cut in the sandstone rock, and there are fragments of a castle. Near the town is a chalybeate spring, the road to which is an agreeable promenade; and in the environs are many handsome villas, the residences of the more wealthy manufacturers. The old name of Kidderminster was *Chidderm'aster* meaning the minster on the brow of the hill. At one time the poet Waller owned a portion of the manor of Kidderminster.

KID NAPPING, in law, implies the forcible abduction or stealing away of a man, woman, or child from their own country, and sending them to another. More popularly it is used to designate the offence of stealing or forcibly carrying off a child or adult without reference to any particular place. For the law as to such offences see ABDUCTION.

KIDNEY BEAN. See BEAN.

KIDNEY ORE is a compact or cryptocrystalline variety of red HEMATITE. It consists of concentric coats of anhydrous ferric oxide, which have mostly a radiated fibrous structure. It is generally hard; but with clayey impurity it becomes soft. It contains about 70 per cent. of metallic iron when pure, has a hardness of about 6 and specific gravity of 5. It has procured its appellation from its external reniform structure.

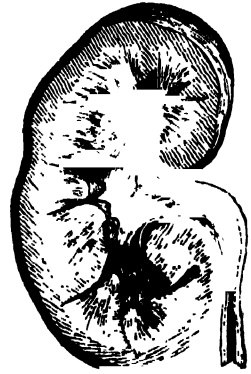
KIDNEYS are two glands lying in the lumbar region, on each side of the spinal column. They are composed of numberless and delicate tubular ramifications, on whose walls there is a fine network of capillary arteries and veins, and which are all collected into one mass of a firm fleshy consistence, inclosed in a fibrous capsule. The ureter, through which the urine secreted from the blood by the kidney is conveyed to the bladder, dilates at its extremity into a wide pouch, the sinus or pelvis of the kidney, which is divided into several portions, called calyces. Into each calyx a nipple-like process, or papilla, projects, at whose extremity there are several minute orifices, each opening into a very fine canal, which, as it is continued into the substance of the kidney, ramifies and becomes tubular. On all these canals, or tubuli miniferi, minute blood vessels, which, with a number of rounded bodies called the corpuscles of Malpighi, secrete the urine, which is conveyed from the tubuli into the calyces, and from them through the pelvis of the kidney, when the ureter carries it into the bladder.

Diseases of the Kidneys.—In common with all other important organs of the body, the kidneys are liable to many forms of disease. Among these inflammation of the kidneys, or nephritis, is not uncommon. It arises from various causes, such as the mechanical irritation arising

from the presence of calculi or gravel, exposure to cold and wet, any affection that tends to the retention of urine, the use of certain irritating drugs, or the spread of inflammation from neighbouring parts. Where the inflammation is acute there is a deep-seated pain in the lower part of the back, which sometimes extends downwards to the thighs; there is an altered appearance of the urine, which deposits mucus, pus, or blood; and there are very often marked symptoms of fever. The treatment consists in rest, the use of diluents and of medicines, such as buchu, copaiva, sandal-wood oil, &c., which have the power of diminishing irritation. Suppression of urine, or *Ischuria renalis*, is generally a symptom of some other disease, but it sometimes arises from a mechanical obstruction in the kidney itself, or from a cessation of its secreting action. Should no urine be separated from the blood the urea undergoes a chemical change which causes it to act as a narcotic poison, and the coma it induces is sure to be followed by death if the action of the kidneys cannot be restored. The treatment of this affection requires both local and general means, but in all cases skilled medical advice is necessary. Some further information as to the diseases of the kidneys will be found under BRIGHT'S DISEASE; CALCULUS, RENAL; DIABETES; DROPSY; and GRAVEL.

KIEL, a seaport of Germany, and the chief town of Holstein, is beautifully situated on a bay of the Baltic, which forms an excellent harbour, 53 miles by railway from Altona and Hamburg, and has 44,000 inhabitants. The town, which is surrounded with walls pierced by five gates, is pretty regularly built, with straight well-paved streets. It has a university, founded in 1665, connected with which there is a library of 150,000 volumes, an observatory, and botanic garden. New university buildings were occupied in 1876; the old ones now contain a museum of national antiquities, which has many objects of a prehistoric period. The manufactures consist of iron goods and machinery, linen, hats, tobacco, refined sugar, &c.; shipbuilding is carried on. The trade has much increased since the completion of the Kieler Canal, which joins the Baltic and the German Ocean, and enters the harbour of Kiel. The exports chiefly consist of butter, cattle-bones, oil-cakes, and cheese to Holstein, Hamburg, and Great Britain. The imports are principally corn from Denmark and Prussia, and coal, slate, and iron from Great Britain. About 5000 vessels annually enter and clear at the port—more than half being German. Steamboats ply regularly to Copenhagen, Aalborg, &c. The chief public buildings are the cathedral church of St. Nicholas, of the thirteenth century, a handsome palace, the public baths, and grammar-school. The castle has a sculpture gallery, with copies of the best works of art. The charming environs attract inland visitors in summer intent on recreation and sea-bathing. Kiel became part of Prussia, with Holstein, after the Danish war in 1864. A very extensive series of harbour works, quays, and docks, have been constructed, and Kiel has become the most strongly fortified and best protected harbour in Europe. It now commands the entrance to the Baltic to so great an extent as almost to render it a mere German lake.

KIEV or **KIEFF**, a government of Russia in Europe, lying between 48° 30' and 51° 30' N. lat., 28° 40' and 33° 25' E. lon., is bounded west by Podolia and Volhynia,



north and north-east by Minsk and Tchernigof, east by Pultawa, and south by Kherson. It has an area of 19,689 square miles, and a population of 2,580,000. The surface is in general flat, with a few undulations which follow the course of the rivers. The land in the north of the government of Kiev is extremely rich and fertile; in the south the soil is poorer, but still there are here also tracts of luxuriant cornfields and good pastures. The whole government belongs to the basin of the Dnieper, which forms the north-eastern boundary for nearly 250 miles. The interior is drained by the numerous feeders of it from the left bank. The climate is mild and dry, and adapted to all the productions of the temperate zone. The rivers usually freeze in December and thaw in February; the north wind is always severely felt in winter. The heat is great in summer.

Agriculture is the chief employment of the inhabitants, and wheat is extensively exported to Odessa. The soil produces all kinds of corn, pulse, millet, hemp, fruits, flax, hops, and tobacco. Beet-root is largely cultivated, and beet-root sugar is extensively manufactured. Cattle are numerous and of good breed; horses are small; swine are kept in great numbers; sheep are scarce. The forests produce excellent timber, and large quantities are annually floated down the Dnieper to the ports of the Black Sea.

KIEV, the capital of the above government, is built on a hill on the right bank of the Dnieper, and has 130,000 inhabitants. The town is divided into eight districts, of which the most important are the old convent and fortress of Petchersk, in which are the celebrated catacombs, containing the bodies of 118 saints; Old Kiev, which contains the fine cathedral of Santa Sophia, and is the residence of the Russian archbishop; Podol, containing most of the private houses, numerous churches, an imperial palace and town-hall; and Vladimirstadt, which was built by Catherine II. Kiev is the seat of the governor-general of Little Russia, capital of a Greek eparchy, and has a civil and criminal court. It is 670 miles south of St. Petersburg, and 490 south-west of Moscow, is fortified, and has an arsenal. Besides its cathedral, churches, convents, and a Greek ecclesiastical academy, it has a university, founded in 1831, called St. Vladimir's University, which is frequented by students from the governments of Kiev, Podolia, and Volhynia. It contains the oldest Greek ecclesiastical academy in Russia, which was founded in 1588. The university has cabinets of medals, mineralogy, zoology, and botany, and most of the collections transferred from the old University of Vilna. There is also a Russian theological seminary, with a large library, two gymnasia, and an establishment for the education of the daughters of nobles.

Kiev is one of the oldest towns in Russia, and was its capital for three centuries. In 980 the Grand-duke Vladimir here embraced Christianity and cast Perune, the thunder-god (the Slavonic analogue of Zeus of the Greeks and Jupiter of the Romans), into the sea, after the image had been soundly cudgelled by twelve stout men. The great point of attraction in Kiev is the catacombs, previously alluded to. They consist of two caverns, excavated in the precipitous cliff which faces the river. They were once occupied by living, and have since accommodated the remains of departed monks and saints. The bodies are arranged along the sides in open collins, but enveloped, like Egyptian mummies, in wrappings, so that no part is left visible. But the stiffened hands are so arranged as to receive the kisses of devotees, and on the breasts are written the names of the deceased, with occasionally a brief record of their lives. Kiev is thus the Jerusalem and Mecca of Russia, and is annually visited by multitudes from all parts who seek an interest in the intercession of the defunct. They perform the whole journey on foot, seldom sleep under a roof, and depend upon precarious charity for subsistence.

Kiev is not an industrial but a commercial centre, and its fairs are among the largest in the Russian Empire. The Dnieper is here crossed by a remarkable suspension bridge, the work of an English engineer (Mr. Vignolles); 3500 tons of iron were employed in its construction, all of which, as well as the requisite machinery, were wrought in England. Fifteen vessels conveyed this material to Odessa, and it was then transported in bullock waggons over the steppes.

KIL'DA, ST., the most western of the Hebrides, is situated in 45° 49' N. lat., 8° 32' W. lon., and consists of an uneven mountain-ridge, the most elevated point of which rises 1380 feet above the sea-level. The greatest width of the island is about 2 miles, and the length 3 miles, and it contains about 4000 acres. Except at the landing-place on the south side, and at a rocky bay on the north, the island is wholly fenced round with lofty inaccessible precipices. The landing-place, except during southerly breezes, affords good anchorage. The population in 1881 was 80, who inhabit a village in the south-east, and live in a great measure on the eggs of sea-birds, which are exceedingly abundant. They are also occupied in rearing cattle and sheep, and in fishing.

KILDARE, an inland county of the province of Leinster, in Ireland, is bounded north by Meath, east by Dublin and Wicklow, south by Carlow, and west by Queen's County and King's County. Its greatest length from north to south is about 40 miles, and its greatest breadth east to west 27 miles. The area is 118,196 acres. The population in 1841 was 115,190; in 1881 it had decreased to 76,102, of whom 66,181 were Roman Catholics.

Surface and Soil.—The surface is more level than that of any other county of Ireland. The only considerable elevations are the hills of Rathcoole, which form the western extremity of the range of the Dublin Mountains, and a detached group which occupies part of the southern margin of the Bog of Allen, in the central northern division of the county.

An open table-land divides the middle and southern parts of Kildare into two districts, of which the one slopes gradually towards the river Liffey on the east, and the other towards the river Barrow on the west. The west district is divided into three open vales by low ranges of undulating ground, extending in parallel directions from the central table-land towards the south-west. The most northern of these vales contains the rivers Podge and Little Barrow; but the chief rivers of the county are the Barrow and the Liffey. That part of the valley of the Liffey which is included within this county is tamed by the western slope of the Dublin Mountains on the one side, and by the subsidence of the table-land of Kildare on the other. The country in this neighbourhood is in a high state of cultivation. The western bank of the river, particularly from the point where it enters the county to Leixlip on the Dublin boundary, is almost wholly occupied by a succession of domestic lands, including numerous residences of the best class. The river Bog crosses in the north of the county.

The common called the Curragh of Kildare, a tract of about 8000 acres in extent, is the property of the crown, and is scarcely to be matched for the excellence of its turf and the richness of its verdure. There is a large permanent military camp, which has accommodation for 10,000 men, and where the Prince of Wales went through the usual routine of camp life for some months in the year 1861. Most of the Curragh is used as common pasture ground; but it also contains a well-known racecourse—the Newmarket of Ireland—and a part of the Bog of Allen. The north-western part of the county, extending from the Bog of Allen to the Boyne, is open and chiefly in pasture. Besides the Royal Canal, the Grand Canal, and their branches, which connect it with Dublin, Waterford, and

the Shannon, the county is intersected by the Great Southern and Western railways, which pass through or near the towns of Naas, Newbridge, Kildare, Monasterevan, and Athy. Large quantities of turf are sent to Dublin by the canal.

Climate.—The climate, from the quantity of boggy surface exposed (about 50,000 acres in all), is more moist than that of the neighbouring counties on the north and south. In the central district the air is pure and keen, and milder and more salubrious in the valleys of the Liffey.

Geology.—The clay-slate, which flanks the granite axis of the Dublin and Wicklow Mountains, occupies about one-fourth part of the surface of Kildare. The granite tract of Carlow extends into the south-eastern extremity of this county. The remainder of the county is occupied with the floetz limestone of the great central plain, broken only by the group of Dunmurry and the Hill of Allen. The latter is composed of a mass of granular compact greenstone and greenstone-porphry protruded through the floetz limestone. The soil is generally a rich loam, resting on limestone or clay-slate. There are rich fattening lands in the baronies of Carberry, Clane, and North and South Salts, which occupy the north-western and north-eastern portion of the county. An improved system of agriculture has been introduced by the resident proprietors, and is practised to some extent by the smaller farmers. The general crops are wheat, oats, and barley. The best English breeds of cattle have been introduced. The minerals of the county are unimportant. The only manufactures carried on are of paper, cotton, and woollen, but only to a very limited extent.

Kildare contains the Roman Catholic College of Maynooth. Until 1870 this was aided by an annual parliamentary grant of £28,500, which was commuted for a payment of £100,000 on the dis-establishment of the Irish Church.

History.—In the ancient division of Ireland the present county of Kildare was divided among many families. The Fitzgeralds became the ruling family about the close of the thirteenth century, and maintained their authority, with many fluctuations, to the sixteenth. This county was the theatre of various military operations during the wars which succeeded the rebellion of 1641. The Kildare family were active in bringing about the restoration, and espoused the Protestant cause in the subsequent wars of the Revolution of 1688. Many earthen works, partly military and partly sepulchral, remain in this county. Numerous sepulchral mounds may be seen on the Curragh, and pillar-stones of large dimensions in other places. Round towers exist at Kildare, Taghadow, Kileullen, and Castledermot. There are also ruins of numerous religious houses. At Castledermot, Moone, and Old Kileullen are stone crosses ornamented with curious sculptures. Seventeen ancient castles are still standing, of which those of Kilkea, Donadra, and Leixlip are still inhabited.

KILDARE, 32 miles south-west from Dublin, is a small and poor town, which contains a Roman Catholic chapel, monastery, and friary. Population in 1881, 1174. It has a station on the Great South-western Railway, and the celebrated Curragh races take place in April, June, September, and October. The Protestant cathedral, which is partly ruined, contains the burial vault of the earls of Kildare. Kildare is also the see of a Roman Catholic bishop, and has, besides, a county infirmary, market-house, and jockey club. The town was once of great importance; and notwithstanding its present decayed appearance, is exceedingly interesting for its antiquities, the most remarkable of which is a round tower, 130 feet high, with a beautifully marked doorway. It is of uncertain date.

KIL'IAN, ST., the Apostle of Franconia, was an Irish monk, who, in the latter part of the seventh century, devoted himself under papal sanction to missionary labours

in Eastern Franconia. He was accompanied by a band of twelve companions, among whom were the presbyter Coloman and the deacon Donatus, and their labours were so successful that the reigning Duke Gozbert and many of his subjects became converts to Christianity, and Kilian was made Bishop of Würzburg by Pope Conon. The duke had married Geila, his brother's widow, before his conversion, but Kilian pronounced the marriage unlawful, and induced him to put her away. In consequence of this Geila took advantage of the temporary absence of Gozbert to cause Kilian and his companions Coloman and Donatus to be murdered in 689. Another account speaks of their being the victims of an unjust judge, whose name was Gozbert. The relics of these martyrs are preserved in the cathedral at Würzburg, and their martyrdom is commemorated on 8th July.

KILKEN'NY, an inland county of the province of Leinster in Ireland, is bounded north by Queen's County, east by Carlow and Wexford, south by Waterford, and west by Tipperary. Its greatest length north to south is about 45 miles; its average breadth is about 21 miles. The area is 793 square miles or 507,254 acres. The population in 1881 was 99,064, of whom 93,699 were Roman Catholics and 4963 Protestant Episcopalians. The inhabitants in 1841 numbered 202,746.

Hydrography and Surface.—The navigable rivers Barrow and Suir form the greater part of the eastern and the whole of the southern boundary of Kilkenny, and the partly navigable Nore traverses its entire length from north to south-east. The northern part of the district between the rivers Nore and Barrow is occupied by a mass of high lands, spreading into numerous lateral groups, the general direction of which is from N.N.E. to S.S.W. These valleys are watered by the rivers before named, and by the minor rivers Dian, Dineen, Dubglass, Owenree, Munster River, and Clodagh. The ranges of hills have various designations in different parts of the county; such as Castlecomer Hills, Slievenamur range, Brandon Mountain, 1696 feet high, Coppinagh range, Walsh Mountains, and King's Mountain. Several of the summits rise to an elevation of 1000 feet. The county contains a considerable number of small towns and villages; and in the most picturesque spots are many beautiful mansions and parks. Five miles south-east of Ballyragget is the remarkable cave of Dunmore. The entrance is by a picturesque hollow clothed with brushwood, at the extremity of which the cavern opens by a natural arch 50 feet high. There are several chambers within, incrustated with stalactites and traversed by a subterranean stream. Beyond the central district nearly all the southern part of the county is occupied with hilly tracts, connected on the east with the granite group of Carlow, and on the west with the range of Slievenamur. A tongue of alluvial land, called the Boer, extending above 2 miles in length, occupies the south-eastern extremity of the district at the point of junction of the Nore and Barrow. With the exception of this spot the western bank of the Barrow from Graigue to the Nore is precipitous, and in some places clothed with natural wood. The space between the southern declivities of the Walsh Mountains and other groups ranging towards Tipperary and the Suir is occupied to a breadth of from 2 to 5 miles by a level tract of rich land. The river Suir is navigable for vessels of 120 tons up to the bridge of Carrick. At the bridge of Waterford it is in some places 8 fathoms deep at low water. The Barrow is navigable to a considerable distance from its mouth. The general slope of the surface is to the south-east, which is the best aspect both for sun and shelter. Surface waters run off rapidly, and there is very little bog; the air is consequently dry and healthy.

Geology.—Except the mountain groups of the south, the entire surface of Kilkenny is occupied by the limestone

of the central plain, overlaid in the hilly districts north of Kilkenny city by shale and sandstone. The coal formations are nearly coextensive with the hilly districts; the limestone, where it forms the surface-rock, spreads into undulating plains sweeping round the high grounds, and occupying the intermediate valleys. These anthracite coal-beds would be of great commercial value if the natural resources of Ireland were better developed. The general colour of the limestone is a bluish-gray. Near Kilkenny it passes into a fine black marble, containing a great variety of shelly impressions. These beds are extensively quarried, and the blocks dressed on the spot by a saw-mill driven by the Nore. The marble, which is sometimes procured of a jet-black, is manufactured into chimney-pieces, tombstones, &c.; it bears a very high polish, and can be raised in large blocks. Marl is found in large deposits in various parts of the county. The mountain tract occupying the south of Kilkenny, with the exception of the primitive group of Brandon, consists of a nucleus of clay-slate surrounded by sandstone. There are many chalybeate springs in the county.

Produce and Manufactures.—Only a small portion of Kilkenny is unfit for tillage. The hills of the northern districts are round-backed and accessible, and the Walsh Mountains are mostly suitable for pasture. The group of Brandon is the only considerable extent of rough land in this county. In the coal-tract the soil is a moory turf lying over a stiff whitish clay, which is the poorest district out of the mountain region. Many districts have deep rich soils. The soil of the hilly country on the south is dry and kind, but it is badly inclosed and destitute of shelter. Some of the best wheat and meadow lands in the south of Ireland are situated in the level tract along the Suir. There are two districts almost wholly occupied by dairy farmers, the Walsh Mountains and the southern part of the Castlecomer tract.

The manufacture of carpets, diapers, and tapestry was introduced into the county by the Countess of Ormond in 1359. James, duke of Ormond, about the middle of the seventeenth century, established and encouraged, at a great expense, both linen and woollen manufactures; and about the close of the same century the Bessborough family introduced the manufacture of linen into the southern parts of the county. These manufactures, which long flourished throughout the county, as well as that of blankets, introduced about a century ago, have now materially declined. A coarse frieze for home consumption is made among the peasantry. There are many flour-mills in the county, and the principal export is grain. There is also some trade in beer, whisky, and leather; but agriculture is the pursuit of the great body of the inhabitants. The chief crops are wheat, barley, bere, rye, oats, and potatoes, which ripen earlier than in most of the other Irish counties. Dairy and sheep farms are numerous, and the breeds of stock are chiefly native. Two crossing lines of railway intersect this county, and the navigable rivers and the Grand Canal furnish facilities for transport to all parts of Ireland.

History and Antiquities.—Kilkenny, as part of Leinster, belonged to the Earl of Pembroke in the early part of the thirteenth century; but on his death in 1217 it passed into the hands of various proprietors. Its early history is chiefly occupied with the feuds of the family of Ormond against the houses of Desmond or Kildare. The Graces also during this period were engaged in perpetual hostilities with the Fitzpatricks, Kavanaghs, and other Irish families. During the Civil War against Charles I., Kilkenny was mostly held by opponents of the crown.

Circular stone inclosures of the pagan era remain on the summits of the hills of Cloghmanita near Freshford, and Tury Hill, or Slieve Grian, near Kilnacow. The latter appears to have been a sepulchral cairn, inclosing a kistvaen, or stone chamber. The covering stone of the cromlech at

Kilmogno is 45 feet in circumference, and is elevated at one end 15 feet from the ground. Another cromlech at Ballyheniberry has a covering stone 16 feet long, 10 feet broad, and 3 feet thick. There are numerous similar monuments of smaller dimensions throughout the county. The remains of raths and earthen tumuli are also of frequent occurrence. There are five round towers, one adjoining the cathedral church of St. Canice in Kilkenny, the others at Kilree, Tullocherin, Fertagh, and Aghaviller. Of the monastic ruins the most extensive and interesting are those of Jerpoint Abbey, on the Nore, 2 miles from Thomastown. The ruins occupy 3 acres, and are a fine specimen of the mixed Anglo-Norman and Early English architecture. There are also monastic ruins at Graig and other places. The castles are very numerous, the chief one being Grandson Castle in Iverk, an ancient seat of the Butlers. It has three round towers towards the Suir, and two courtyards.

KILKENNY, a city and county of a city, the capital of the above county, 73 miles south-west of Dublin, is finely situated on both sides of the Nore, the older and principal part occupying the western bank. It takes its name from the cathedral church (of St. Kenny or Canice) of the diocese of Ossory, founded here about the end of the twelfth century. The place was selected by the early Anglo-Norman invaders for the site of a castle. The present castle, built in 1195, occupies a commanding site on the west bank of the Nore, and is the residence of the Marquis of Ormond. The cathedral is seated on a gentle eminence on the same side of the river, at the opposite extremity of the city. The small river Bregagh, running into the Nore about midway between these points, divides the city of Kilkenny Proper from Irishtown, or St. Canice, the former having originally been a dependency on the castle, the latter on the cathedral. The large suburb on the opposite side of the river, called Englishtown, is connected with Kilkenny Proper and Irishtown by two handsome bridges. Englishtown still retains its name, but Irishtown has merged into the city of Kilkenny.

The chief object of antiquity is the cathedral church of St. Canice. It is a cruciform building, surmounted by a low tower; it extends from east to west 226 feet, and from north to south 123 feet. The chapel of St. Mary in the north transept serves as the parish church. The oldest parts of the edifice appear to be of the architecture of the early part of the thirteenth century. Of the original castle there remain three massive towers worked into large additions in the French taste of the seventeenth century, made by James, duke of Ormond, in 1682. The building occupies three sides of a quadrangle, having a garden and fountain in front and a lofty terrace towards the Nore. The abbey church of St. John's has been converted into a parish church. Black Abbey has been partly restored, and converted into a church for Roman Catholics. The body and tower of the Franciscan friary are still standing.

The town is well built, and has a busy and cheerful appearance, particularly that portion of it constituting Kilkenny Proper. It is the largest town in Ireland wholly inland. The building material is usually stone whitened or dashed with rough-cast. Kilkenny contains a county court-house, county prison, city prison, barracks, infirmary, fever hospital, union workhouse, cathedral, bishop's palace, chapter-house, deanery, a round tower, two parish churches, seven Roman Catholic chapels, one of which (the cathedral) has been recently built, two monasteries, two convents, Presbyterian and Methodist meeting-houses, an endowed grammar-school, called the College of Kilkenny, a Roman Catholic college, national schools, a lunatic asylum, almshouses, &c. At the college Swift, Congreve, and Bishop Berkeley were educated.

The coarse linen and woollen manufacture, although much decayed, is still carried on, but the corn, provision, and general retail trade now form the principal business.

There are several distilleries, breweries, tanneries, and flour-mills in the town and its vicinity. Coal and marble are raised in the neighbourhood: the former burns without smoke or flame; the latter, which is black, is much used for chimney-pieces and ornamental purposes. The streets of the town are also paved with it.

There were formerly two municipal corporations, one for the English and the other for the Irish town; but by the provisions of the Municipal Reform Act they are amalgamated, and divided into two wards, each having three aldermen and nine councillors. The story of the Kilkenny Cats (who fought so ferociously that, when the fight was over, only the tail of each was left) is an allegorical satire upon a contention between these municipalities towards the close of the seventeenth century. They contended so stoutly and persistently about boundaries and rights, that they impoverished each other.

Kilkenny appears to have been a place of some importance before the arrival of the English; for Strongbow built a fortress here, which was enlarged and strengthened by William, earl marshal, and subsequently by the earls of Ormond, in whose possession it has continued for centuries. Parliaments were frequently held in this city; and a famous statute, passed in 1371, for regulating the intercourse between the English and the native Irish, is still quoted by the title of the Statute of Kilkenny. In the wars of 1641 the assembly of the confederated Catholics

held its meetings here, in a building which is still, on that account, an object of curiosity to strangers. In 1650 it surrendered to Cromwell. The population of Kilkenny in 1881 was 14,964.

KILLARNEY, a town of Ireland, in the county of Kerry, situated $1\frac{1}{2}$ mile from the Lower Lake of Killarney. It consists mainly of two good streets, from which branch several poor lanes and alleys. In summer, from the influx of visitors to the lakes, the town presents an animated appearance, but in winter is very dull. There are a venerable old parish church, a Roman Catholic cathedral for the diocese of Kerry, a nunnery with female school attached, a court-house, market-house, and assembly-room; union workhouse, hospital, and many fine hotels and reading-rooms for tourists. Killarney is 46 miles west-north-west of Cork, and the terminus of the Cork and Killarney Junction Railway. The population of the parish, which includes a part of the lake scenery (being altogether 31,789 acres in extent), is 6651. The cathedral (Roman Catholic), from designs by Pugin, at the west end of the town, is an imposing structure. There is also a magnificent hotel, erected by the railway company. The only manufactures carried on in the town are those of toys and fancy articles, made of the wood of the abutus, which is here very abundant.

KILLARNEY, LAKES OF, three lakes near the middle of the county of Kerry in Ireland, connected with



Muckross Abbey.

the highest mountain group in the country, and celebrated for the romantic wildness of their scenery. They discharge into the Atlantic, north-west, by the Lane, and lie at the east extremity of the extensive range of mountains called MacGillenduff's Reeks. The largest of the lakes, called the lower lake, occupies an area of about 3000 acres; its west shore is formed by the mountains of Tomies and Glenna, respectively 2150 and 2090 feet above the level of the sea, leaving their precipitous sides well clothed with forest trees; on the opposite shore is the striking contrast of flat land in a high state of cultivation. There are said to be no fewer than thirty-three islands, many of which are extremely picturesque. One of these islands, Innisfallen, is justly considered the gem of Killarney, with its wild

scenery and its ruins of the abbey of St. Finian, dating from the sixth century. On the south shore of this lake is the fine ruin of Muckross Abbey. The lake is in some parts very deep. Between Glenna Mountain and Ross Island, the largest in the lake, the soundings goe 42 fathoms. The middle lake occupies about 610 acres: it lies immediately under the Fore or Turk Mountain, elevated about 1900 feet above the level of the sea. The strait which joins the middle and upper lake is about 3 miles in length, having in many places the appearance of a beautiful river. The upper lake contains about 720 acres. It lies in a hollow, formed by some high mountains, among which are Gurrán Tual, the highest in Ireland, rising 3404 feet above the level of the sea; so that its scenery is in the

highest degree magnificent and sublime. In other places, however, especially on the east shores of the lower and middle lakes, the scenery is of the softest and most agreeable kind, consisting of finely wooded promontories, ornamented with rivers and seats and verdant islands; and it is in the contrast between these and whatever is most wild and rugged that lies the great charm of Killarney. The Lane issues from the north-west extremity of the Lower Lake, and after pursuing a west-north-west course for about 10 miles falls into the Castlemaine Harbour, at the bottom of Dingle Bay. It is well stocked with salmon and white trout, and also with pearl oysters, whence pearls have been repeatedly taken.

KIL'LAS is the name applied originally by the miners of Cornwall to the slates and schists of that county. Its application has become so extended that it is now a mining term applied to almost any stratified rock in contradistinction to igneous rocks. A Cornish miner classifies almost all rocks as either granite, elvan, or killas, corresponding roughly with plutonic, trappean, and sedimentary rocks.

KILLER WHALE. See GRAMPUS.

KILLIECRANKIE, BATTLE OF, was fought 27th July, 1689, by the troops of William and Mary, under General Mackay, against the forces which were held together in Scotland by Graham of Claverhouse, then Viscount Dundee, in the interest of James II. The two armies confronted each other at the Pass of Killiecrankie, in Perthshire. The royal army numbered 4000; that of the Highlanders only 2500 foot, with a small troop of horse. The contest was decided in a few minutes: the Highlanders rushed on with their swords, and instantly scattered the enemy. Mackay lost 2000 men; Dundee, 900. The latter fell by a musket shot in the moment of victory, and shortly afterwards Scotland peacefully submitted to the Revolution Settlement. Professor Aytoun has made this battle the subject of a fine historical poem, entitled "Killiecrankie," and its incidents are described with characteristic eloquence by Macaulay in his history.

KILMARNOCK, a market-town of Scotland, in the county of Ayr, 65 miles south-west by west from Edinburgh. It has railway communication with Glasgow, Paisley, Ardrossan, Irvine, Troon, Ayr, Dumfries, and Carlisle. The old streets of the town are narrow and inconvenient, but the modern streets are spacious and handsome, and many new dwellings, shops, and offices of a superior description have been erected, the most important being the corn exchange, which has a great hall, used for meetings and concerts, capable of accommodating 1200 persons, and contains the Kilmarnock Library. Other important buildings are the town-hall, built on a bridge over the Kilmarnock Water, the court-house, the exchange buildings, agricultural hall, theatre, hospital, observatory, Kilmarnock House, now a ragged and industrial school, the Laigh Kirk or low parish church, with a fine organ, the High Church, five Free churches, four United Presbyterian churches, an Original Secession church, two Evangelical Union churches, a Baptist chapel, an Episcopal and a Roman Catholic church. A monument to Burns, the first edition of whose poems was issued here in 1786, was erected in 1879, and there is a fine public park. Kilmarnock has various manufactures, some of which are extensive, especially calico printing, worsted printed shawls, and carpets. The manufacture of boots, shoes, and bonnets is also very considerable, and there are large tanneries. There are five bridges over the Kilmarnock Water, and a viaduct of twenty-four arches carries the railway across part of the town. The extensive machine works of the railway company give employment to a large number of artisans, and in the neighbourhood are numerous collieries. As early as 1603 mention is made of the manufacture of hose and of bonnet-making, and at one time the town was noted for its cutlery. Kilmarnock signifies the "Church of St. Marnock." It is

governed by a provost, six bailies, a treasurer, a dean of guild, and sixteen councillors. In 1881 the population of the parish was 25,861; of the town, 23,901.

KIL'OGRAMME, a French measure of weight of 1000 French grammes, equal to 2.2046 lbs. avoirdupois. To convert pounds avoirdupois into kilogrammes, divide by 2.2046. But roughly speaking the kilogramme may be taken as equal to 2 lbs. 3½ oz.; and 51 kilogrammes equal 1 cwt. and nearly half a pound over (7½ oz. beyond the cwt.) The kilogramme is equal to 15432.34 grains troy. See GRAMME.

KIL'OGRAMME TRE, the French unit of work, corresponding to our foot-pound. We measure by the number of pounds the given work will raise one foot in height, the French measure by the number of kilogrammes the given work will raise one metre in height. A kilogrammetre equals very closely 7½ foot-pounds. The French horse-power is 75 kilogrammetres per second, and is therefore nearly 2 per cent. smaller than the English horse-power. From our point of view French engines are always overstated in power, because of this discrepancy.

KILOMETRE, the French itinerary measure, contains 1000 metres, or 1093.633 yards. A kilometre is almost exactly five-eighths of a mile, exceeding that measure by 6 yards only.

KILSYTH, a burgh of barony of Scotland, in the county of Stirling, 13 miles E.S.E. from Falkirk, 10½ N.E. from Glasgow, and 137 from London, being 2 miles from the Croy station of the North British Railway, stands at the junction of the roads from Falkirk and Stirling to Glasgow. It is irregularly laid out, and the houses are small and mean-looking. The parish church is a modern building of considerable elegance, but having become too small for the population another church has been built in the village of Banton. There are also a town-hall, assembly rooms, Free and United Presbyterian churches, Independent and Wesleyan chapels, and a Roman Catholic church. The manufactures consist principally of cotton goods to supply orders from Glasgow. There are several factories, also some coalpits and ironworks. The Forth and Clyde Canal passes within half a mile to the south, and has contributed greatly to the prosperity of the district. The parish are several Presbyterian and Roman antiquaries. Montrose gained a victory over the Covenanters at Kilsyth in 1645. Population of the town in 1881, 5445; of the parish, 6849. Sir James Livingston (a branch of the noble house of Linlithgow) was created Viscount Kilsyth (1669) on account of his loyalty during the civil wars, but the title was attainted and the estates forfeited in the person of the third viscount, who joined the rebellion in 1715.

KILT, a loose dress falling from the waist to the knee in the guise of a short petticoat. The word is a substantive coined from the ancient *kilt*, to tuck up, still in use as a verb in the Danish and Swedish languages and in our own northern dialects. The ultimate origin is shown in Swedish and Icelandic to be a "lap;" and its earliest form is the Mæso-Gothic *kilthai*, belly. In fact it is from the same source as our word child, originally spelt *cild* and pronounced *kild*. [See article on the letter K.] The kilt was formerly worn in the Scottish Highlands by men, but the fashion is said to have been introduced by an English tailor. The tunic is undoubtedly Celtic. After having been considered for many years a national dress, the kilt is now seldom used, though retained by a few Highland regiments.

KILWINNING, a town of Scotland, in the county of Ayr, situated on the Garneck, and on the Ayr Railway, 3 miles N.N.W. of Irvine. It has cotton and silk manufactures, and a parish church, a Free church, a United Presbyterian church, an Original Secession church, an Evangelical Union chapel, and a public school and library. Kilwinning is celebrated for its abbey, founded by Hugh de Moreville, constable of Scotland, in 1140, and dedicated

to St. Winning. It was at the Reformation one of the richest in the kingdom. It is said that the foreign architect who built the abbey was the first to introduce the craft of Freemasonry, and on the strength of this the lodge of Kilwinning disputes with that of Edinburgh the right to be considered the mother lodge of Scotland. In the statutes of 1599, however, Edinburgh holds the first place. Kilwinning is the seat of a body of archers which has maintained the practice of archery, with many curious customs, almost uninterruptedly since 1488 or even earlier. The population of the parish in 1881 was 7037; of the town, 3469.

KIMBERLEY, a town of South Africa, in the province of West Griqualand, in Cape Colony, situated near the Orange River, 520 miles north-east of Cape Town. It has fine shops, churches, schools, theatres, &c., an organized municipal government on the British model, and is now the largest and most important township in the interior of South Africa, and the centre of the diamond mining industry of the province of West Griqualand. It has also become the entrepôt for the trade to the interior and to the Transvaal. The town and suburbs contain above 2000 houses; and the population of West Griqualand numbers 80,000, of whom 20,000 are whites. The want of water was long one of the greatest drawbacks to the successful working of the diamond mines, and was also felt to be a great inconvenience to the residents, but it has now been brought from the Vaal River, 17 miles distant. The town was formerly called New Rush. From the diamond mines in four years gems were obtained worth £6,000,000. The gems are found in isolated basin-shaped hollows filled with alluvial matter, which terminate downwards in the natural rock, and in some places are worked as deep as 250 feet.

KIMBOLTON, a small town of England, in the county of Huntingdon, 9 miles south-west from Huntingdon and 87½ from London by the Midland Railway. The town is small and unimportant. The church has a tower with a lofty spire, and contains some monuments of the Manchester family. There is an endowed grammar-school, and brewing, malting, tanning, and brick-making are carried on to a small extent. Near the town is Kimbolton Castle, the residence of Queen Catherine after her divorce from Henry VIII., and now the seat of the Duke of Manchester. It has recently been renovated and much altered. The park is very extensive and well stocked with deer. The remains of Stenely Priory are also in the vicinity.

KIM ERIDGE CLAY, so called from Kimeridge Bay, in Dorsetshire, where it is exposed in the cliffs, is one of the members of the Jurassic formation. It occurs at the base of the Upper Portland Oolite, and is generally about 500 or 600 feet thick; but beneath the Weald formation, where it was cut in a boring, it exceeded 900 feet. The Kimeridge clay is a dark gray shaly clay with layers of sand, bituminous shales, and cement stones; the lower portion is most rich in fossils. The outcrop of this formation extends from Dorsetshire to Yorkshire; in some of the Midland counties it almost dies out, and northward in some places it is completely overlapped by cretaceous strata. The large oyster, *Ostrea deltoidea*, is remarkably characteristic. Belemnites are abundant; ammonites and other shells common, also fragments of wood, and the remains of turtles, crocodiles, saurians, and fishes.

KIM HI or **KIMCHI, DAVID**, generally quoted by the word *Redak*, from the initials Re Da K. (Rabbi David Kimhi), was a celebrated Spanish Jew, who was born at Narbonne somewhere about 1160. His father Rabbi Joseph Kimhi was the author of numerous commentaries and grammatical works, and his brother Rabbi Moses was also a grammarian of considerable eminence; but David surpassed them both, and by virtue of his profound scholarship became not only the first Hebrew grammarian of his age, but the greatest that has ever arisen. His chief pro-

ductions were the Hebrew grammar and lexicon entitled the "Sepher Michlol" or Book of Perfection, and these two works have been the basis of all the more important works that have since appeared of a similar character. The first edition of this work was printed at Constantinople in 1532-34 in folio, and the second, an octavo, at the same time and place. It has been frequently reprinted since, the Venice edition by Elias Levita of 1545 being one of the best. A revised edition of the lexicon was published at Berlin in 1847, and an edition of the grammar at Lyck in 1862. Kimhi was also the author of commentaries upon nearly all the books of the Old Testament, some theological works, and a controversial work against Christianity. He was the first to discover the distinction between the long and short Hebrew vowels, and was chosen as the arbiter in the celebrated controversy which arose among the French and Spanish synagogues concerning a work of Maimonides. The date of his death is uncertain.

KIN, NEXT OF. See NEXT OF KIN.

KIM'ON (*Kimûn*). See CIMON.

KINCARDINESHIRE, or the *Mearns*, as it is commonly called, is a maritime county of Scotland, bounded N. and N.W. by Aberdeenshire, S. and S.W. by Forfarshire, and E. by the North Sea. Its greatest length north to south is 35 miles; its greatest breadth east to west, 21. The area is 388 square miles, or 248,284 acres. In 1881 the population was 34,460—16,972 males and 17,488 females.

The Gampian Hills occupy the western and central parts of Kincardineshire. Mount Battock, the highest summit, rises 2611 feet above the sea; Clach-na-Bayne is 1906 feet. This elevated and sterile region comprises about one-third of the county. The rest, to the extent of more than 100,000 acres, is well cultivated, and the soil fertile throughout. In the south and east lies the rich, low, arable tract called the How of the Mearns, comprising about 50,000 acres on a basis of Old Red Sandstone. The climate is mild. The estates in the county are generally large; the farms of all sizes, some from 400 to 500 acres, and the best generally let on lease for about nineteen years. Great improvements have been made recently in agriculture. The chief crops are oats, grain, barley, turnips, potatoes, flax, and wheat. Cattle, chiefly of the short-horned breed, are fed on most farms, and the mountains yield extensive pasture for sheep. The shores of Kincardineshire abound in fish, and are one of the principal resorts of the herring, many thousand barrels of which are cured annually, but the nature of the coast and the want of harbours sufficiently capacious prevent the full development of this trade.

The mineralogy of this county is not of great importance. In many places there are limestone quarries, and as the stone is of excellent quality a more abundant supply of fuel is all that is wanted to render them of great value. There are also granite and sandstone quarries.

The principal rivers are the Dee on the north and the North Esk on the south. The other streams, the Dye, Cowie, Carron, Bervie, and Luther, are small, but some of them contain good salmon fisheries. The weaving of dowlais, household and coarse linen, &c., is the chief manufacture. A large number of wooden snuff-boxes are also made. The county does not contain any towns of importance. The chief is Stonehaven.

Kincardineshire includes eighteen parishes, and parts of three others, and two presbyteries in the synods of Aberdeen and Angus and Mearns. This county was part of the Roman province of Vespasiana, and Roman stations are traced at Raedykes and Fordoun. There are also old castles at Dunottar, Kame of Mathers, and Fordoun. Mernia, a brother of King Kenneth II., is said to have been normaer of the district, and hence its name the *Mearns*. An old proverb would seem to show that the district was noted for the strength of its inhabitants. It runs, "I can dae fat I dow, the men o' the Mearns can dae nae mair."

KIN'DERGARTEN (Ger., garden of children, child-garden). There is really no translating this word, in itself a very charming and appropriate name for one of the sweetest and noblest conceptions ever framed. It is due to Friedrich August Wilhelm Froebel, the German educational reformer [see FROEBEL], and was invented by him as describing that institution for the education of children from three to six years old which shall prepare them for the school. Here teachers must be women—man's nature is powerless over such tender plants, says Froebel; and he insists with never-wearying repetition that these ladies must view their educational work as if it were a sacred office. For these opening years, if rightly considered, are the most important of all; habits are silently forming which can never afterwards be eradicated, traits of character are developing, intellectual activity is awakening which, if not encouraged, will almost surely be dwarfed and stunted for the whole of the coming life. Like a gardener, who can impart no force, who establishes no laws, but who studies intimately the plants under his care; whose office is only to sustain and encourage the efforts which they make for themselves, by providing light, air, water, and space—occasionally, too, aiding them with a prop, sometimes, on the other hand, cautiously using the pruning knife—if she carefully watches her Kindergarten, her child-garden, the gardener-teacher will see leaves and flowers and fruit arrive each in due time.

Education is incessant in the Kindergarten, teaching or direct instruction is almost absent. Knowledge is to be gained from within, not from without—"intuitive education," as it is called abroad, is the guiding principle. The office of the teachers is no longer to impart instruction, but to set before the children tempting banquets on which their hungry little souls may be drawn irresistibly to feed; their main care is now to see that this mental food, while delicious, is of the most wholesome and nutritive description. In this way, too, it is evident we cannot over-educate. We can never go too fast nor too deep for the child if we allow it to teach itself. We are to provide the tools, the child is itself to be judge with how much vigour to use them.

And what are these tools? *Toys and games.* Watch children at play, all untiring eagerness and earnestness, and you will begin to wonder that it was left for Froebel—and for him only towards the close of a long life spent in the study of education—to discover this simple truth. It flashes on one with irresistible force; the children teach us how to teach them. But the class of toys, the plan of games, must not be taken haphazard; here steps in the careful educator with the principles which should guide us in selecting the elements of that moral and intellectual atmosphere in which our child-plant is to grow, and from which it is to derive sustenance, so that goodness and strength shall be unconsciously absorbed, and a pure, vigorous, and noble life shall result.

Froebel regarded nature, like Goethe, as the "living robe of God," and the study of nature's laws as the study of the expression of the divine will. "In everything," he constantly asserts, "is a spark of divine fire, and this spark works for good, if unchecked—must be good, always good." Therefore his aim in educating children is to develop every phase of their character, never to repress, but always to train. "So," he says, "the duckling seeks the pond, the chicken keeps on dry land, the young swallow hardly descends from the sky—what is natural is right."

He uses, as we have said, *toys* as his lesson-books, and he gives clear scientific principles to guide us in our selection of suitable toys, which his disciple, Köhler, thus puts into condensed practical form:—(1) Toys must be cheap and simple. It is for the teacher to develop the full value from their simplicity. (2) Toys must be durable, to guard against that misdirection of healthful activity called destructiveness. (3) They should be capable of variety, not

too fixed in idea, nor too complete in themselves. (4) They must be harmless. (5) They must not be unlovely in appearance or meaning. (6) They must be capable of development, not showing their full meaning all at once. (7) They must be suitable for teaching as well as play. (8) They must contain among them the rudiments of an entire education. (9) Lastly, they must by their interconnections suggest the unity of nature and the relation of appearances to realities; and further, by their power of representing objects, they must bring these principles practically home to the child.

One might think it well-nigh an impossible task to find toys which would fulfil these requirements, but Froebel himself has found them—in his well-known six gifts, which we may here very briefly notice.

The first gift is six soft balls, of the three primary and three secondary colours: red, blue, and yellow—orange, purple, and green. Colour, form, motion, are shown by the ball, which swings to and fro, backwards and forwards, up and down, spins like a planet on its axis, or circles in space. The use of language is learned moreover in the child's description, probably by a little song, of the motion of the ball; and the muscles of the hand and of the body generally are exercised in catching the pretty rolling or flying thing. The unity of form is seen through the diversity of colour. And thus all the mental elements are developed; for from spontaneity and from the perceptions and memories of agreement and of difference, the whole complex fabric of the mind is built up. Truly may Professor Croom Robertson say, "This of Froebel's appears to be the only strictly scientific system of education yet developed."

The second gift is a wooden ball and cube, and the intermediate form, partaking of the nature of both—the cylinder. See how unsteady the ball is, how steady the cube; how unsteady one way the cylinder, and how steady the other way. The ball will not slide, the cube will not roll; the cylinder both rolls and slides. Suspend the cube by one corner, it will form a ball as it twists rapidly round; suspend it by one face, and it forms a cylinder. The cylinder forms a sphere, similarly suspended and twisted. Thus, again, unity in the greatest diversity is discovered. But it must not be supposed that the children use this scientific language; to them the cylinder is but a steam roller, which they march before with red flags to clear the way; the cube is a box, a house, &c. But they do not pass on from this gift till the teacher perceives that all the ideas mentioned above are firmly part of their little brains, though as yet they may be unable to formulate them in words.

The third gift is a cube cut in half each way, giving eight smaller cubes. We counted up to 6 with the balls, we counted 6 faces in one object with the cube, we now count up to 8, and if we will, to 48. Further we can count halves, fourths, eighths; arithmetical exercises begin. Here also building gives a field, however rough and rude, for the creative and formative instinct inherent in each healthy child: houses, chairs, tables, &c., are built, each representation using up all the material—a great principle with Froebel—and being explained by the child-architect so that he may gain further use of language.

The fourth gift is a cube cut once vertically and three times horizontally, giving eight brick-shaped pieces; which division of itself adds materially to the child's perception of form, as each separate piece now has three distinct varieties of face to be noted and distinguished. Further, a closer representation of objects is possible in "building;" and this is now required by the child's increasing power of observation.

The fifth gift is cut twice in each direction, giving twenty-seven cubes, six of which are cut diagonally giving prisms, and three of these again halved into smaller prisms

(quarter cubes). Here we have reached the oblique line, and have power over square numbers up to 25, and cubes up to 27, the nature of which is easily grasped by the child as he makes the corresponding figures with his bricks. Fractions and the elements of geometry are demonstrable, too, in a practical delightful way by this most valuable gift.

The sixth gift adds to the building facilities of the cubes, by a further division giving columns, &c. One of the most experienced of Kindergarten teachers has been heard to say of these remarkable divided cubes, "With bricks you can teach anything."

Now Froebel further has given us a wonderful series of *occupations* for the children, which are designed to teach number, form, colour, &c., as well as to cultivate their powers of observation and imagination. They serve further to illustrate objects or stories; and finally, as being beautiful in themselves, to gratify and form the æsthetic elements of the character. These may be classed as arising out of the cube, through its plane surfaces, its edges or lines, and its corners or points.

Thus in surfaces are used both wooden and paper planes, and as the cubes are always of some definite measure (generally 2 inches on the side), so also are the wooden planes (generally an inch), which are in the forms of squares and of triangles of all sorts. With these the child learns geometrical figures, and creates lovely designs; colours also are introduced to heighten the effect. Paper, as before of some given measure (generally exactly 4 inches square), the reason of which is obvious, is used (1) in paper-folding, very valuable for its teaching-faculty in geometry and the symmetry of form, and beloved by the children for its power of representing houses, boxes, ships, animals, &c., in hundreds of clever ways; (2) in paper-plaiting, delightfully exact in its representation of number, especially of multiplication and division, and dear to the children as giving them delightful occupation in weaving mats of brilliant colours, and sometimes of quite intricate design; and (3) in paper-cutting, when the cut fragments are pasted together in a pattern which the child may himself invent, and which is often of rare beauty—to say nothing of the fascination to him of the act of pasting.

Lines give some occupations of inestimable value. The jointed lath is most useful in demonstrating angles, a power possessed in still greater degree by the elegant paper-twisting, which demands much neatness in execution. Stick-plaiting resembles the mat-weaving already spoken of. Stick-laying and ring-laying give the power in combination of forming letters, and as the little sticks used in the former may be broken in halves or quarters, a new and striking view of fractions is gained; and the power of representing natural objects, and of illustrating stories, is given by no other occupation better than by this. A valuable advance, the power of representing solid objects, is given by pea-work, where the sticks used in stick-laying serve now to connect softened pease, so as to indicate cubes, prisms, &c. But the children love to make a houseful of doll's furniture in this charming fashion, and the teacher gladly assists; for she knows that real knowledge is being acquired, as it were by stealth. Thread-laying is a very graceful device for representing forms in outline by wetted thread laid on a slate, to which it gently adheres, retaining whatever shape a pencil point may give it. Finally, drawing on a chequered slate or paper is perhaps the most valuable of all, where all are of such great value, for it teaches the bases of arithmetic and geometry, and prepares the way for freehand drawing and for writing, inducing the children to produce, by its wonderful multiplying power (much as does the kaleidoscope), forms of unexpected beauty and symmetry.

Finally, points are the basis of very valuable occupations.

First, of course, beadwork suggests itself as a powerful aid to the perception of number and colour; and buttons

are often used to be laid as points over a given design; but the great use of points in the Kindergarten is for paper-pricking, first on chequered paper, then on freehand outlines—a most beautiful occupation, as beloved by the children as it is prized by their teachers. The paper thus pricked is also sewn through the pricked holes by embroidery, and needlework is in this way foreshadowed. Our girls, it has been said, often seem to learn sewing only to spend time in embroidery; it is at least curious to find the children learning embroidery that they may become able to sew.

But a more direct power of representing objects is necessary to the child. Froebel therefore gives him also moistened sand, and clay, and colours, and his most favourite lessons are the building, modelling, and painting which result.

This sketch of the practical work of the Kindergarten is avowedly extremely imperfect, for to develop all the meaning and value of any one of the occupations would take more space than has been devoted to them all. But even such a hurried survey must not omit to notice the *songs, games, and stories* which play so important a part in Froebel's method. These all serve to develop the social feeling, that sense that each child is a member of the whole body which he rightly considered of such paramount importance. Through them, also, the child unconsciously gains many a fact in natural history and many a moral lesson; the fancy is developed, and each learns to give way when his neighbour's turn comes. By them, too, as well as in the form of a simple hymn, the child is often taught to look at nature with religious feelings. These serve also as the seasons for gymnastic exercises, artfully contrived; the children fly round the room as pigeons, or scamper to and fro as timid hares; now it is the windmill which whirls round its sails; now it is the cooper who hammers his cask; and all the class, often all the Kindergarten down to the very babies, must help to make the perfect game. Thus kindness and order and obedience to duty spring up naturally and become firm habits, as much part of the child as his limbs or his senses.

Long ages ago Montaigne said, "Les jeux des enfants ne sont pas jeux, il les faut juger en eux comme leurs plus sérieuses actions;" but to show the way in which this serious value of child's-play can be utilized, to give children solid instruction (or rather to allow them to find it for themselves) without sacrificing the spontaneity and freshness which are the charm of happy childhood—this triumph was reserved for Froebel in the Kindergarten.

The main centre of the Kindergarten movement in this country is the Froebel Society of London; and it is to their unwearied efforts that the modification of the infant school system now permitted and encouraged by government is due. The London School Board may be specially mentioned as adopting a considerable part of the Kindergarten system in its infant schools, providing skilled trainers and inspectors at once to instruct and to watch the teachers, and see that so far as regulations permit the system is thoroughly and efficiently carried out. The Froebel Society of London in its annual syllabus of examinations appends an exhaustive list of all the existing literature on the Kindergarten in English which is of real value, including also the chief German and French authorities.

KINETICS (Gr. *kinēsis*, motion), the branch of dynamics which treats of the movements produced by forces not in equilibrium; the correlative to the other branch of statics which deals with forces which are in equilibrium.

The result of forces which are not in equilibrium acting on a body is that the body is set in motion; and the work that must have been done upon a body in order to set it in motion, supposing it to be simply at rest when the work began, is called the *energy of motion* or *kinetic energy* of the body. It is equal to half the mass of the body mul-

tiplied by the square of the velocity. The principal problems of kinetics are dealt with under MOTION.

KING, the ancient English name for the chief ruler of a country. In its earliest form of the Old English, *cýning*, it gives a false impression of being derived from the root that gives us the verb *can* (the modern German *können*), and of meaning therefore the cunning, canning, or able-man. Carlyle thus uses it as bearing out his autocratic views of government:—"The finding of your Able-Man, and getting him invested with the symbols of ability, with dignity, worship, royalty, or whatever we call it, is the business of all social procedure whatever in this world. Parliamentary motions, French Revolutions, all mean at heart this, or else nothing. Find in any country the Ablest Man that exists there, raise him to the supreme place, and loyally reverence him, you have a perfect government for that country; no ballot-box, constitution-building, or other machinery whatsoever can improve it a whit" ("Hero Worship"). Nevertheless the true derivation of king, that is of *cýning*, is that which brings it from *cyn* (or kin), the tribe; the king is the "son of the tribe," the suffix *-ing* having the force of "son." The ultimate derivation is from the Aryan root $\sqrt{\text{KAN}}$ to beget. The true English king was in fact, as the etymology of the word imports, elected by the tribe; and Carlyle is therefore right in his description of the king as chosen, though wrong in his etymology. But a graver error with Carlyle is the confusion of later despotic ideas of kingship with its original form in the English and other Teutonic folk. The *Englisc* when they dwelt along the shores by the Elbe had no kings, they were freemen, each as good as his fellow. Certain of them were *eorls*, and formed a kind of aristocracy above the *ceorls*, whose chief privilege it was to furnish the *caldorman* to the tribe. But the *eorls* who were not for the time being *caldormen* were as purely subject to the ruling of the elders as others were. The men of experience, both *eorls* and *ceorls*, assembled in *witena-gemot* on any grave emergency, and this meeting of the *Witan* or "wise men" was the supreme authority over the whole tribe.

In time of war the military talent of one of the *eorls* was sure to mark him out for *heretog* (in modern German *herzog*, duke), that is, the military leader. Such *heretogan* were Hengest and Horsa, chiefs who led the English conquest of Britain in 449. But their marvellous success led to unexpected results. In its nature military success is personal: the victorious leader is followed for himself, not for his rank; and in the history of the world are to be found but few Washingtons or Wellingtons—great commanders who lay down their command as soon as its work has been accomplished and aim at no further reward. Hengest, left alone by Horsa's death, speedily made himself not *caldorman* but king, a perpetual and more powerful office, combining the functions of *heretog* and *caldorman*. Still our English kings were strictly elective, and strictly dependent on the consent of the *Witan* in matters of great import. Just as the *caldormen* were always chosen from the *eorls*, so also the kings in England were always chosen from the descendants of those chiefs who first led them to Britain, and whose deeds were celebrated as half-divine. But that the eldest or any other particular son should reign after his father, or even any son at all, if one of the elder members of the family were a better statesman, was never admitted as a rule. Probably we must go down to Edward II.'s accession, in 1307, before we can safely say that the English crown is hereditary in the sense of passing by custom to the eldest son of the king at the king's death. Even Edward I. declared that he was king "by hereditary succession and by the goodwill and fidelity of the magnates." This point is elaborated in the article upon the CROWN; and to the examples there given we may add a few before the Norman Conquest. Thus

Ethelred I. was chosen before his young nephew in 866; Alfred the Great before the sons of Ethelred; Athelstan, the illegitimate son of Edward the Elder, was chosen before his legitimate brother in 925; Edred before Edwy in 946, and Edward the Confessor before the son of Edmund the Ironside in 1042. The steady growth of the power of the king, subject only to the two checks of this elective franchise and the increasing wealth and authority of the nobles or barons, and the right of deposition by the *Witan* or the Parliament, is fully shown in the article CROWN already referred to. But from the time of Edward I. there has grown up side by side with the power of the king in England the power of the Parliament. From feeble beginnings it came to be very powerful under the Lancastrian kings, for their title depended entirely on a parliamentary vote. On the other hand the royal power eclipsed the popular power under the masterful rule of the Yorkists and the Tudors. Then, in its turn, the Parliament overthrew the crown altogether after a life-and-death struggle under the earlier Stuarts. After the Restoration Charles II. tried by craft, James II. by force, to regain the Tudor position; but the result was the great Revolution which seated William III. on the throne as the first parliamentary constitutional sovereign, and which by the BILL OF RIGHTS gave us those blessings of a republic without its evils which we now enjoy. As is elsewhere said [see CROWN] the sovereign of England remains head of the church, of the army and navy, and of the law, even to the extent of reversing the decisions of the judges, as in the well-known prerogative of mercy; has the power of making peace and war, of choosing ministers and governors, of creating peers and of summoning Parliament, dissolving or proroguing it, and vetoing its acts. Up till the reign of Victoria many of these prerogatives were actually carried into effect by the king himself, but Queen Victoria very early began and consistently carried out an adherence to constitutional forms of government and an abandonment of personal authority far beyond any precedent set by her Majesty's predecessors. In this way, avoiding that distressing periodical fight for power which the republican system necessitates, the responsibility of ministers and the freedom to call them strictly to account without any fear of injuring the stability of the crown, and therefore the power of enforcing at all times the national desires, have been fully enjoyed by our favoured country. "Her Majesty's opposition" came to oppose, not her Majesty, but "her Majesty's government," i.e. the royal advisers. England will ever hold in honour the queen and her patriotic advisers, chief among them her uncle Leopold, king of Belgium, and her consort Prince Albert, for this great boon. The most marked difference in which the new departure is shown is in the monarch ceasing to attend cabinet councils [see CABINET] and to make public appointments; for though, of course, all cabinet ministers and all persons appointed to any position in the king's name still hold their places by the favour of the king, the appointments are in fact made by the responsible ministers strictly subject to the monarch's sanction. If ever this sanction is withheld the greatest care is taken to prevent the general public from becoming acquainted with the fact.

The King of England wears the oldest crown of Europe, reigns over the most loyal subjects, enjoys the greatest security, and has the most perfect assurance of his crown peacefully passing to his heir. His power, if truly looked at, is greater than ever it was. The entire freedom of the people gives to the nation a force, and therefore to the king as its representative a force, which no other monarch possesses. Meanwhile, all jealousy of the royal prerogative being at an end, the personal influence of the court upon the manners and well-being of the people has full and uninterrupted sway. Clothed with the most ancient dignity and honour, and with the truest and most lasting authority,

namely, that dependent upon the affection of his subjects, the King of England stands far in advance of the other princes of the world.

A *queen regnant* (as Queen Victoria, for example) differs in no wise as to her functions and authority from a *king*. But the consort of a king is also called *QUEEN*, and her position is elucidated in the article upon that subject.

The word *king* is also used to translate the titles of supreme officers of other and very diverse kinds. Thus the kings of Egypt (*Phrah* or Pharaoh), of Assyria, of Israel, (and the neighbouring tribes), of Persia, of Greece (*Basil-eus*), of Rome (*Rex*), of France (*Roi*), and of other modern countries, though they are as different in their meaning as in their etymology, all come under the translation *king*. In the Old Testament we read how after trying a sort of republican government under leaders ("judges") chosen upon emergency, and after sinking so low that the Philistines held the greater part of the land and the Ammonites were at the point of devouring the remainder, the bold and warlike Saul was chosen king by the Hebrews against the earnest appeals of Samuel, the last of the "judges," and how, after once testing the superiority of the regal authority, the people put up with its many evils rather than return to comparative anarchy and defencelessness. It is presumable that a very similar development of kingship would occur among the Oriental nations; and the military success of Saul, which gained him his crown, or at least the public acceptance of his rule (1 Sam. xi. 15), is doubtless a type of the personal manner in which other monarchies began. The Oriental kings of whom we have spoken above were strictly despotic, and the slavish adoration which they exacted, even to the extent of divine honours being paid them while alive (a custom adopted many centuries later by some of the Roman emperors), is most abhorrent to the minds of modern men. On the other hand, the kings of European countries have very rarely exercised a despotic rule. Perhaps the later Bourbons in France came nearer despotism than any others. The Greeks had a special name for despotic monarchs; they called them *Tyrannos*, not *Basil-eus*, and from *Tyrannos* comes our word tyrant. The Greek meaning of the word was simply an unconstitutional ruler, and many tyrants (as Peisistratos of Athens, for example) were excellent rulers; but since human nature is not perfect enough to bear uncontrolled responsibility, tyranny and cruelty gradually came to mean one and the same thing. In legendary times, for which Homer is our great authority, every chief of any pretension was called king; but it is not difficult to detect the real monarchs from the mere chieftains. Although in the *Iliad* (ii. 204), the dictum occurs that "The rule of many is not a good thing; let us have one ruler only—one king—him to whom Zeus has given the sceptre and his tutelary sanctions," yet we find an *agora* or general assembly called on every great occasion. And as with ourselves, so in ancient Greece this *agora* found means to acquire the supreme power early in the historical period, whether as a republic, as at Athens, &c., or as a nominal monarchy, as at Sparta, &c. The Spartan "kings" were almost analogues, in fact, of the Roman consuls, reigning always in pairs and serving somewhat similar though perhaps less important functions. When therefore in later Greek history the despotic kings of the barbarous neighbouring state of Macedon threatened to overwhelm the land, they met with much resistance. The resistance was ill-organized, or in fact had no organization at all, and Alexander of Macedon found but little difficulty in making himself master of Greece. Alexander proceeded to conquer Asia as well, and it is very striking to note in his conduct as monarch of Asia those Oriental superhuman assumptions of which we spoke above. No passages of the elder historians impress us more than those wherein Alexander, whose birth was perfectly well known, gives himself out in Asia as the son of Zeus Ammon, and

receives divine honours from his chief generals prostrate before him, while he marries a variety of foreign princesses and starts a complete Persian harem. He has been spoken of as Hellenizing Asia—rather should it be said that he sought to Asiaticize Greece.

Different alike from these Oriental despots and from the constitutional kings of later Europe were the kings of early Rome. These were the *governors* of the state, the *reges* or rulers, a word found in many tongues and still extant in India as *rajah*, that is, the man who makes straight or right. It is not without its meaning that *rex* and *right* are at bottom the same word, both of them coming from the Aryan root $\sqrt{\text{RAG}}$. The *rex*, then, or king of ancient Rome was elected, and his office was for life, but was neither hereditary nor limited to a family, though some of the kings were related. Perhaps this character might have been afterwards developed had not the Tarquins by their ill rule overthrown the kingship and brought about the famous republic. The king of Rome was in every particular the same to the state as the *paterfamilias*, the Roman father, was to the single family. Beside his palace was the ever-blazing hearth-fire of the city, in the temple of Hestia or Vesta, and the state-gods protecting the treasure-house, the *Penates*. He consulted the gods and nominated the priests, commanded in peace and war, had the right of punishment, even of capital punishment, and in all these things exactly resembled the Roman father. He nominated his successor, who then appeared to the people for their election. But any Roman might be king; there was no confusion of godship with kingship, as among the Orientals, and no divine sanction of the kingly rule, as with the "divine right" and the "regal sanctity" of many modern nations; the king was an ordinary burgess whom the necessity of having one absolute master in every house, so paramount in Roman eyes, had caused to be set up as father of the state. He had to execute the laws, he had no power to alter them nor to impose new ones—that rested entirely with the public assembly. As Mommsen justly remarks, "there is no counterpart in modern life either to the Roman household or to the Roman state," and the latter was but an extension of the former. [See FAMILY.] Even the family council, always consulted in grave cases, was represented in the kingly times by the *SENATE* (*senes*, elders), an assembly which was afterwards to become the chief governing body of the republic.

KING WILLIAM'S TOWN, a county of Cape Colony, in the eastern province, forming with East London, south of it, what was formerly called British Kaffraria. The area is 1781 square miles, and the population 110,000, principally of Kafir origin. The Great Kei River forms the eastern boundary, the Keiskama the western, dividing it from Victoria East. The sea is on the south, and the Amatola Mountains, the eastern part of the Great Winterberg, on the north. Other rivers are the Genubie, Buffalo, and Sonto, and many smaller streams traverse the rich and beautiful vales. The country is also better supplied with rain than most parts of Cape Colony, and the climate is highly salubrious; extreme temperature, 90° and 50° Fahr. The country rises from the sea-board in successive terraces, but King William's Town and East London counties contain more level land than most others on the coast, while in almost every part the soil is fertile and adapted to tillage. The Debe Flats towards the middle form the most considerable plain. Fine pastures descend to the water's edge, but the higher pasture lands are better suited to sheep and goats. Along the coast the sugar-cane, coffee, pine-apple, and banana are grown; maize and other cereals, fruits and vegetables on the hill slopes, the farmers being partly the native Kafirs who have taken to settled habits, but chiefly German colonists, members of the German Legion disbanded at the close of the Crimean War. The native population is gradually acquiring settled habits,

and rivalling the settlers in their industrial occupations. The most numerous are the Gaikas, Sandillis' tribe.

KING WILLIAM'S TOWN, or **KING**, the capital of the above county, stands on the Buffalo River, here spanned by a fine iron bridge, 40 miles from its mouth at the port of East London. The town is pleasantly situated in the plain called the Debe Flats, is well and regularly built, and contains many good edifices, as the town-hall, several churches, the Grey Hospital, on a height to the north, &c., and a botanic garden of 1.4 acres. The population is about 5000.

KING-AT-ARMS, an officer of great antiquity, who presides over the chapters and directs the proceedings of heralds. At present his chief duty is to regulate the armorial bearings of gentlemen and the order of state ceremonies. In England there are three kings-at-arms—Garter, principal; Clarenceux and Norroy, provincial; so called because the duties of the latter are limited to their provinces. The name *Clarenceux* is derived from the Duke of Clarence, Henry V.'s brother, first king-at-arms for the south of England; that of *Norroy* is Norman-French for northern king. There are also a Lyon king-at-arms for Scotland, and an Ulster king-at-arms for Ireland. See *HERALD*.

KING-BIRD (*Tyrannus carolinensis*) is a species of the family Tyrannidae (tyrant birds), belonging to the order PASSERES, and peculiar to the New World. Both the popular and scientific names of this bird refer to the extraordinary authority which the male arrogates over other birds during the breeding season. All birds likely to injure his mate or her nestlings are dauntlessly challenged and driven away from the nest; the intrepid little bird not hesitating to attack hawks, crows, owls, jays, or even eagles. The only bird which appears to get the better of the king-bird in these encounters is the purple martin, whose determined enmity to all birds of prey is somewhat like his own. The power of wing possessed by the martin is so great, that the king-bird has little chance of touching him, and occasionally the attacked party becomes the attacker, when the king-bird is compelled to seek safety in an ignominious flight before the rapid and easy swoops of his assailant. This quarrelsome demeanour is laid down by the king-bird at the end of the breeding season, which extends over May, June, and part of July.

The king-bird is about 8 inches in length; the plumage of the upper parts is dark ashy-gray in colour, with the head and tail black, the feathers on the tail being capable of elevation, so as to form a sort of crest, when a subadjacent bed of a brilliant orange colour is displayed, which is commonly called the crown of the king-bird. The lower surface is white. The food of this bird consists entirely of insects, which it captures on the wing; its fondness for bees often leads to its destruction by the bee-masters. Its song is a shrill twitter. The king-bird is widely distributed over North America, visiting Central America in the winter. It arrives in the United States about the end of April or beginning of May, and proceeds southwards in September. The nest is built on the branch of a tree, often in an exposed situation, and composed of small twigs and dried flowers, interwoven with tow and wool, and made very compact. The lining consists of fine grass and horse-hair. The eggs, which are usually five in number, are cream-coloured, with a few large purple spots and small pale brown ones, principally at the larger end.

KING-CRAB (*Limulus*) is a genus of aquatic Arthropods whose systematic position has been for long involved

in doubt. It is usually classed with the CRUSTACEA as an aberrant member of that class. Van Beneden on embryological, and Ray Lankester on anatomical grounds, have insisted on its agreement with the ARACHNIDA generally, and with the SCORPIONS in particular. Professor Ray Lankester (*Quarterly Journ. Micros. Science* July and October, 1881) has instituted an elaborate comparison between the king-crab and the scorpion, proving that the relationship between them is as close as between the latter animal and the spider.

The body of the king-crab is in the form of a broad oval shield ending in a long sword-shaped spine. When viewed dorsally the shield is seen to be composed of two chitinous plates, a large overhanging carapace with its posterior angles produced on each side, and a smaller posterior plate somewhat hexagonal in shape, bearing on each side six movable spines, and notched posteriorly by the dagger-like tail. On the under surface of the region overhung by the carapace are found six pairs of leg-like appendages; so that this region (*cephalothorax*) is composed of six segments. The cephalothorax of the scorpion in like manner consists of six segments with six leg-like appendages, but its carapace does not overhang the body. The first pair of appendages in the king-crab is a little pair of nippers composed of three joints, exactly equivalent to the *chelicerae* of the scorpion. The next four appendages are in the form of *chela* (pinchers), made up of six joints, the basal joints being produced into processes which play against their fellows of the opposite side and act as jaws. In the male king-crab the second appendage does not end in a pair of claws, but is a simple walking limb. The sixth



Limulus moluccanus.

appendage is very remarkably modified for burrowing in the sand and mud: it is composed of seven joints, of which the fifth bears four flattened movable, secondary processes which are useful in digging. The second appendage of the scorpion is like that of the female king-crab, but relatively larger; the next four are ambulatory, not chelate. The ventral surface of the cephalothorax is not, like the dorsal, uniformly protected by chitin. A small chitinous plate is developed (both in *Scorpio* and *Limulus*) between the mouth and the bases of the first pair of appendages, forming a kind of upper lip. Following the basal joints of the sixth pair of appendages *Limulus* presents a pair of closely opposed upstanding chitinous pieces, which act as a lower lip: these have been named *chilaria*, and have been considered to represent a pair of appendages. It has, however, been shown that they appear later in development than the appendages, and find their homologue in a median pentagonal plate similarly placed in *Scorpio*.

Following the cephalothorax in the king-crab is the abdominal carapace, having the anus placed at its hinder end, followed by the post-anal spine. In the embryo this abdominal region consists of a series of separate segments, but in the adult the upper surface is fused into one large chitinous plate. The original segmentation, however, as far as the thirteenth segment, is indicated by a series of ridges, and

(from the eighth to the thirteenth segment) by deep pits sunk into the back for the attachment of muscles, and by the six marginal spines. The succeeding piece exhibits in the adult no trace of segmentation, but in the embryo presents two more segments; while in the extinct Eurypterida, which undoubtedly are closely allied to *Limulus*, there are four segments between the segment corresponding to the thirteenth of *Limulus* and the anus-bearing segment. In the first segment following the cephalothorax, both in *Scorpio* and *Limulus*, is placed the genital aperture, protected by an opercular plate formed by the union of the bases of the appendages of that segment. In the king-crab the five following pairs of appendages in the same way form plates which bear a series of exceedingly delicate lamellae. Each lamella is a gill composed of two membranes, between which the blood circulates; the plates are called "gill-books." In *Scorpio* the eighth pair of appendages are the "pectines" or "combs," carrying fine lamellae set like the teeth of a comb; they have lost any respiratory function. Following these are four pairs of lateral slits (*stigmata*), within which are found the "lung-books," appendages bearing lamellae similar in character to the gill-books of the king-crab. There can be no doubt that these lung-books represent the "combs" of the eighth segment, sunk beneath the surface and adapted for aerial respiration. In the king-crab Professor Ray Lankester has found, on the ventral surface of the segments which bear the gill-books, and also at the base of the opercular plate, *stigmata*, or apertures leading into pits, corresponding to the *stigmata* of the pulmonary sac of the scorpion. These *stigmata* are connected with the attachment of a series of powerful muscles, whose function is to agitate the branchial plates for the purpose either of respiration or locomotion, or probably for both simultaneously. The caudal region following the branchial in both animals is devoid of appendages, and is followed in both by the post-anal spine, which is long and sword-shaped in the king-crab, but in the scorpion is short and forms the sting.

Thus it has been shown that both in *Limulus* and *Scorpio* the body can be divided into three regions, each showing more or less distinctly (if *Limulus* be taken in conjunction with the Eurypterida) the presence of six segments; these regions are—the cephalothorax, bearing appendages subserving mastication and locomotion, a mid genito-branchial region, and a caudal region bearing no appendages, ending with the anus, and a post-anal spine.

The agreement between these two forms, with regard to the internal organs, is also remarkable. For details we must refer to Professor Lankester's paper, already quoted, and also to the article *Scorpion*.

Limulus is remarkable for the possession of an internal skeletal piece, the *entosternite* (found in *Scorpio* and other Arachnida). It is a large fibro-cartilaginous plate, lying behind the alimentary canal in the anterior region; it is not connected in any way with the external skeleton, but gives rise to a large number of muscles.

The nervous system of the king-crab consists of a cerebral mass from which proceed two cords, which form a ring or collar round the œsophagus, and approaching one another closely a little further down, are continued as the abdominal cord to a point in front of the anus. No distinct ganglionic masses can be distinguished in the œsophageal collar, which is bridged, as it were, by several transverse commissures. From the cerebral ganglion the nerves to the skin of the head and the eyes proceed; while the nerve-collar gives off nerves to the first six appendages and to the genital operculum, small nerves to the chilidia, and a large number of nerves to the skin. From the abdominal cord the branchial appendages and the caudal region are supplied. The nervous system of scorpion presents a general agreement with that of *Limulus*, but is more concentrated in the anterior region. The king-crab has a

pair of simple eyes placed on the upper surface of the cephalothorax, near the middle line, and at each side a large kidney-shaped compound eye, which, however, resembles more an aggregation of simple eyes (as in scorpion) than such a compound eye as that of a crustacean or insect.

The mouth of the king-crab leads into a powerful suctional pharynx, which is bent upwards and forwards. This leads into the digestive portion of the alimentary canal, which takes a median course, opening into a short rectum. Opening into the anterior part of the digestive tract on each side are two tubes, the ducts of a great gland which occupies a considerable region of the cephalothorax. In the form and structure of its alimentary canal *Limulus* agrees with the Crustacea only in the absence of the Malpighian tubes, which are found in all other Arthropoda.

The heart of the king-crab (and scorpion) is an elongated tube divided into eight chambers, and having a pair of lateral valvular apertures in each chamber. A system of capillaries leading into definite veins exists. From a trunk arising from the anterior end of the heart are given off two arteries, which completely invest the brain and nerve-collar, and run backwards, inclosing the abdominal nerve-cord. A similar intimate connection of the arterial and nervous systems is found in *Scorpio* alone.

In both forms the generative organs consist of a dense meshwork of glandular cæca, which in *Scorpio* are packed in the anterior abdominal segments, but extend in *Limulus* into the cephalothorax.

The male king-crab is smaller than the female. The eggs are discharged into the water and fertilized there. There is no appearance, even within the egg, in the embryo king-crab of the *nauplius* stage typical of all crustacean larvae. In the king-crab the six anterior appendages appear first and the others almost simultaneously.

The species of king-crabs are not very numerous; they are confined to the coasts of North America and to the Chinese Seas (*Limulus moluccanus*). They live in moderately deep water, burrowing deeply in the mud, and feeding on soft-bodied sea-worms. Species of the genus *Limulus* occur in the Lower Secondary rocks, while closely allied forms (as *Bellinurus*) are found in the coal-measures of England and America.

THE EURYPTERIDA (Pterygotus, &c.) and the TRILOBITES, which must be closely ranked with the king-crabs, have been extinct since the Carboniferous epoch.

("Limulus an Arachnid," by Professor E. Ray Lankester; *Quart. Journ. of Micro. Science*, July and October, 1881.)

KING-CROW (*Dicrurus macrocerus*) belongs to the Passerine family of birds, DRONGO SHRIKES (*Dicruridae*). The king-crow is abundant throughout India, and has received its name from the pugnacity which it manifests on the approach of any of the crow family to its nest. As soon as any of these make their appearance, the king-crow attacks them with great clamour, following them pertinaciously, and pouncing down upon them from time to time. The food of this bird consists of insects, and it may be seen looking out for these from a hedge or bush, or some similar slight elevation, or even from the backs of cattle and sheep when grazing in a field. On observing the stirring of an insect in the herbage below it, the king-crow instantly darts down, seizes its prey, and flies up with it to its perch, where it devours it at its leisure. It also captures winged insects in the air, and, in company with other birds, is a constant attendant at the issuing of the winged termites or white ants from their nests, an occasion which furnishes a rich feast. The note of this bird is described as a sort of crow or chuckle. Its flight is undulating, and not very rapid, except when in pursuit of a crow or some other enemy. Its nest is composed of grass, twigs, and roots, carelessly put together, and contains from three to five eggs, of a white colour, with pale brown or purplish spots.

The king-crow is 10 inches in length, of which, however, about half is made up by the long forked tail. It is a slender and graceful bird of a black colour.

KINGFISHER (Alcedinidæ) is the name of a family of birds belonging to the order VOLITORES; their nearest allies are the Jacamars (Galbulidæ) and the Bee-eaters (Meropidæ). The kingfishers form a very large family, varying considerably in size and habits. The bill is always long and powerful, generally quite straight, broad at the base and acute at the tip; in a few genera (as *Dacelo*) it is hooked strongly at the tip. The feet are always feeble and the soles remarkably flat. There are three toes in front and one behind; the external toe in front is united for the greater part of its length to the middle toe, forming what is called a *syndactyle* foot, as in the bee-eaters. The inner toe in front, which is the second digit, is not half the length of the others, and in two genera (*Aleyon* and *Ceyx*) disappears altogether. The hinder toe is also very short. The wings are generally short and rounded. The kingfishers are found in all parts of the world, but only one genus (*Ceryle*) is represented in America; Australia has no less than fifty species peculiar to it.

All the kingfishers are sedentary, watching for their food from a fixed station, which they only quit as soon as their prey approaches sufficiently near to come within the sweep of their wings; if unsuccessful in their first attack, they do not pursue their game, but return again to their post, and patiently wait for another luckless straggler; if their first attack is successful, they return with their victim to the same station, and then proceed to swallow it. Some, in addition, have the habit of hovering in the air like the kite. One branch of the family, of which the common kingfisher is the type, are fish-eaters. Other kingfishers, exemplified by the laughing jackass of Australia, live in forests, feeding on insects and reptiles.

The Common Kingfisher (*Alcedo ispida*), the only European representative of the family, is one of the most



Common Kingfisher (*Alcedo ispida*).

beautiful of British birds; its appearance, as it dashes along in the sun, giving one the idea of a living emerald. The top of the head, the wing-coverts, and a stripe on each side of the neck, are green, covered with most beautiful azure spots; the back is dark green, with its hinder part and the rump azure; the throat, and a streak on each side of the neck, are yellowish-white, and all the rest of the lower surface of the body is pale chestnut. The quill feathers of the wings are greenish-black, and those of the tail deep blue. The beak, which is $1\frac{1}{2}$ inch long, is black, with the base of the lower mandible orange in the female alone. The feet are of a reddish-brown colour.

The kingfisher is an inhabitant of all parts of Europe, except in the extreme north; thus it occurs, although rarely, in Denmark, but does not appear to inhabit the Scandinavian peninsula. It is also met with in the tem-

perate parts of Siberia, and extends thence to the southern parts of Asia, as far as Sind, while in Africa it occurs as far south as the Senegal. It is always found in the vicinity of water, frequenting the banks of rivers and brooks, and also of large ponds, over the surface of which it may be seen shooting along rapidly, like a little green meteor. Its food consists not only of small fishes, but also of aquatic insects and leeches, and probably any other production of its favourite element will hardly come amiss. When watching for food, the kingfisher takes his post on a bush or tree overhanging the water, or on a rail by the bank side, and here he waits patiently until his expected prey comes within sight; then he dashes instantly down upon it, and so rapid are his movements, and so unerring his aim, that he rarely fails in his attack. Sometimes he is seen to hover over a particular point of the surface of the water, waiting for the favourable moment to make his plunge; but when the prey is caught, he always makes his way back to his post of observation, and then swallows his victim head-foremost, usually crushing it first, to prevent struggles during this operation. Although so strictly aquatic in its habits, the kingfisher remains in this country throughout the year, but in severe weather it has been known to quit the inland fresh waters, and to resort to the sea-shore.

The kingfisher is a solitary and pugnacious bird, living in pairs during the breeding season, but rarely allowing any neighbours of its own species. Early in the year it bores a tunnel in the banks of the streams which it frequents. At the end of the tunnel the floor is usually covered with the disgorged bones of the fishes devoured by the birds, forming often a saucer-shaped nest, in which the pinkish white eggs, from six to eight in number, are deposited. The young birds are fed by the parents till they are able to leave the nest, which in the meantime becomes very foul. The note both of the adult and young birds is shrill and piping.

A number of legends, classical and mediæval, have grown up round the kingfisher. The Greeks and Romans, naturalists as well as poets, believed that the kingfisher built a floating nest, and that during the period of incubation, through the kindly influence of the god of winds, the sea was calm and all winds hushed. During these seven "haleyon days" (an expression which has become proverbial) the sailor had nothing to fear from winds or waves. By a later development of the fable (which is beautifully told in Ovid's "Metamorphoses," xi.), the bird itself was believed to have some secret power of stilling the waves. Other superstitions connected with its supposed influence over the weather are still current, as that if accurately balanced and suspended by a single thread from its back, its bill will point in the direction of the wind, to which Shakspeare ("Lear," act ii. scene 2) alludes, in speaking of rogues who

"Turn their haleyon beaks
With every gale and vary of their masters;"

its dried body would avert a thunderbolt, and its head and feathers were a protection against witchcraft, and an un-failing love-charm.

The Alcedinidæ are rich in species, 125 having been described, distributed among nineteen genera. The family is divided into two subfamilies, Alcedininae, containing five genera, and Ceyxinae with fourteen. The Belted Kingfisher (*Ceryle alcyon*), very similar to the English species, is abundant in the United States. *Halcyon sanctus* is a common species in Australia. The Laughing Jackass (see JACKASS, LAUGHING, *Dacelo gigas*), inhabiting New South Wales, is the largest species of the family.

KING'HORN, a seaport of Scotland, in the county of Fife, situated on the Frith of Forth, 12 miles north-east of Edinburgh and 410 from London by the North British Railway. The town, which stands on a slope, is now fairly

well built and well paved. The chief buildings are the town-hall, the parish church, the Free church, the United Presbyterian church, and the public school. There is a good harbour quay at Pettycur, nearly a mile to the S.S.W. There are two flax spinning-mills, a glue factory, and an iron shipbuilding yard. It is governed by a provost, two bailies, a treasurer, a chamberlain, and five councillors. The population of the royal burgh in 1881 was 1439; of the parish, 3650. Kinghorn lays claim to great antiquity; it is certain that it was created a royal burgh as early as the thirteenth century. It was originally a royal residence, but lost that dignity on the death of Alexander III., who was killed (1285) by falling over a rugged and lofty eminence about a mile west of the town.

KINGLET. See **GOLDCREST.**

KINGS, BOOKS OF, two of the canonical books of the Old Testament, which were originally one book in the Hebrew, but which are given as two books in the Septuagint, a division copied in the Vulgate and adopted in the Authorized English Version. In the Hebrew Scriptures the title is as we have it. But both in the Septuagint and in the Vulgate these books are called the third and fourth books of Kings, the first and second being in this division the two books which we call by Samuel's name. The series of four is still indicated in our own version in the sub-titles of the books. The ancient Jewish name for the series of books from Joshua to Kings, which we denominate historical, is "the former prophets"—a name deeply significant. The books which we call prophetic (both the greater and the minor prophets) the Jews termed "the latter prophets." These historical books were compiled rather as works of admonition and religious teaching than as simple histories, and any careful reader will readily acknowledge the skill with which this design has been carried out. They contain a history of the period from the death of David and the accession of Solomon to the destruction of the kingdom of Judah, with a notice of an event some twenty-six years later, viz. the liberation from captivity of Jehoiachin. According to Jewish tradition these books were compiled by the prophet Jeremiah, and it is the opinion of many modern scholars that the books were originally either written or so revised by him as to be recognized as his work. Like the preceding historical books and the books of Chronicles, they are manifestly compilations from the official records of the kingdoms of Israel and Judah, and of certain historical, poetical, and prophetic works, which as separate productions are now lost. From those ancient documents extracts are taken, or an abstract is given of their contents by the compilers or editors, the material being selected in reference to the later and more spiritual conceptions of the religion of Israel, which marked the period of the close of the monarchy. The language of the books is very similar to that of the prophet Jeremiah, but the internal evidence points unmistakably to the original compilation having been subjected to several redactions. The text of these books has been preserved in a very imperfect condition, and our version varies greatly from that which was used by the translators of the Septuagint. These variations include transpositions, omissions, and additions, the latter being the most interesting and important. The chronology of the books of Kings exhibits numerous discrepancies, and some of the dates given are apparently contradictory of each other. Some of them are also plainly erroneous, and are rejected by all chronologers, even such as construct their systems on purely Scriptural grounds. It would appear that no exact chronology was observed in the earlier forms of these books, and that the attempt of the later editors to supply this has led to the present confusion. Some interesting confirmations of the history of these books have recently come to light in the discovery of the Moabite stone, and in the deciphering of the inscriptions received from Assyria, and it is probable that more light

will yet be thrown upon the later history of Israel from the latter source.

It is interesting to compare the very different spirit ruling the composition of the books of Samuel and Kings from that which governs the redaction of the Chronicles. The first are clearly the work of an earnest Judean teacher, it may be Jeremiah, according to the venerable tradition connecting them with his name, or it may be another. Israel's humiliation is shown as the result of the sins of the people, for which the Lord is punishing them; but the belief in Israel's election and the hope of his speedy restoration to righteousness and consequent prosperity is never lost sight of. The author of Chronicles, on the other hand, was undoubtedly a Levite. His ideal is sacerdotal—the splendour of the ceremonies of the temple, its music and its priesthood, are his delight; and the kings who supported them are his heroes. On every occasion the priests are exalted. It is they and not the army (to give a typical instance) who set Joash upon the throne (2 Chron. xxiii.), and so in repeated cases.

The books of the Kings have always been accepted as canonical by Jews and Christians, and they are frequently quoted in the New Testament. Among the best modern commentaries are those of Thenius (Leipzig, 1819, second edition, 1873), Keil (second edition, 1876, English translations, 1872), and that of Rawlinson embodied in the "Speaker's Commentary."

KING'S COLLEGE, CAMBRIDGE, was founded by King Henry VI. in 1413, in conjunction with Eton College, whence all the scholars were formerly supplied by a regular succession, but many of the scholarships are now open. Some peculiar privileges appertain to King's College. The provost has absolute authority within the precincts; and by special composition between this society and the university its undergraduates are exempt from the power of the proctors and other university officers within the limits of the college.

The original buildings of King's College consisted of the present Chapel and a quadrangular court to the north of it. The buildings which constituted this court having become much decayed, it was determined that a large quadrangle should be erected to the south of the Chapel. Gibbs was appointed the architect. The building was commenced in 1724, and he erected on the west side of the quadrangle the Fellows' Building, or Grecian Building, as it is commonly called. Nothing more was done till 1824, when the new buildings were commenced, and completed in 1828. An addition to the south end, very chaste in style, was made by Sir G. Gilbert Scott in 1874.

The Quadrangle is 280 feet in length by 270 feet in breadth, and consists of the Hall, Library, Chapel, and apartments for the fellows and scholars. The Grecian Building, Hall, and Library are handsome structures; but the architectural boast of King's College is the Chapel, the only part of the original buildings which now remains. The first stone was laid in September, 1447. In 1508 Henry VII. gave £5000 towards the completion of the building, and his executors, in 1513, under a power conferred by his will, gave a further sum of £5000 for the same purpose. In July, 1515, the exterior, including the roofs, was completed, but the whole was not finished until 1534.

The interior of this magnificent chapel is 291 feet long, 45½ feet wide, and 78 feet high. Its exterior appearance, with its towers and buttresses, lofty windows, pinnacles, and pierced battlements, is as beautiful as it is grand and imposing. In the interior the vast stone roof, unsupported by pillars, is one of the wonders of architectural skill. Eleven principal ribs spring from the buttresses on each side, forming an arch somewhat flattened at the centre, whence ponderous stones, each of which is said to weigh a ton, hang as pendants. The principal ribs are connected with each other by diagonal ribs, and the entire roof is

formed into one great whole of the lightest and most richly carved fan-tracery. The great east window and twenty-four side windows, each nearly 50 feet high, are filled with painted glass, and form a series of scriptural pictures of exceeding beauty. The great west window alone is of plain glass, probably for the sake of additional light. See *Plate ENGLISH CATHEDRAL ARCHITECTURE*, Vol. v.

KING'S COLLEGE, LONDON, occupies the east wing of Somerset House. It was founded in 1828 on the fundamental principle "that instruction in the Christian religion ought to form an indispensable part of every system of general education for the youth of a Christian community." The college is only intended for Church of England students. The studies embrace theology, literature, science, and medicine. A limited number of matriculated students reside within the walls. There are also evening classes and a school for young men in connection with the college. The museum contains George III.'s collection of mechanical models and philosophical instruments presented by the queen, and also the calculating machine invented by Mr. Babbage.

KING'S COUNTY, an inland county of the province of Leinster, in Ireland, is bounded north by Westmeath, east by Kildare, south by Queen's County and the county of Tipperary, and west by the river Shannon, which separates it from Galway and Roscommon. The greatest length, east to west, is 45 miles; the greatest breadth, north to south, is 39 miles. The area is 772 square miles, or 493,019 acres. The population in 1881 was 72,852; in 1811 it was 147,551, or more than double the present number. There were 64,984 Roman Catholics in 1881.

Surface.—A series of low limestone hills, running in a north-easterly direction, divides the northern portion of the county into two districts of unequal area, of which the one discharges its waters eastward to the Barrow; and the other, which is of about double the extent of the former, westward into the Shannon. This range of eminences terminates, in the north-eastern part of the county, in the conical Hill of Croghan, from which the Yellow River flows northward into the Boyne. The northernmost part of the county is well cultivated; but this is succeeded on the south by peat bog, forming a portion of the great Bog of Allen. This tract, extending about 12 miles every way, is divided into two principal valleys by the Philipstown and Cushina rivers, which flow into the Barrow. The highest part of the bog is 286 feet above the level of the sea. There are numerous other bogs in this county. The valley of the Barrow, which consists on the King's County side of an arable margin interposed between it and the Bog of Portarlington, is highly cultivated, and to a considerable extent occupied by the demesnes of the resident gentry. The district westward of the range of hills is watered by several small tributaries of the Shannon, among which are the Brosna, Clodagh, Frankford, and Blackwater. In this district, as in the eastern, the bogs are very numerous. The bogs on the western side of Tullamore, lying along the southern side of the Grand Canal, occupy an area of 11,588 acres. They are disposed in three principal tracts, separated from one another by low hills of limestone gravel, and bounded on the south by the Hill of Croghan, which separates the bogs immediately bordering on the canal from the more extensive tract lying between its southern declivity and the range of Slieve Bloom. This latter tract, consisting of five principal fields, extends over 23,986 acres. The valley of the Brosna is the best cultivated portion of the north-western division of the county. The river winds between undulating banks, which form a margin of considerable breadth on each side, free from bog, and towards Westmeath spread into a well-cultivated open country. The district included between the Brosna and the county of Westmeath, with the exception of the arable margin of the river, is almost wholly

occupied by bogs. One of the bogs of this district is that of Kilmaleady, now generally known as the "moving bog," which in the year 1821 burst its bounds and overflowed nearly $1\frac{1}{2}$ mile down an adjoining valley.

The remaining portion of the county, included between the Slieve Bloom Mountains, Tipperary, and the Shannon, has a general slope towards the Little Brosna, which forms the boundary between King's County and Tipperary. The portion which descends immediately to the Shannon is bleak moorland, comprising a considerable part of the bogs lying south of Croghan Hill; but the banks of the Shannon are richly clothed with meadows, though liable to frequent floods. The valley of the Little Brosna is an undulating district, containing extensive tracts of pasture, and towards the mountains abounding with varied and pleasing scenery. The highest elevation of the Slieve Bloom Mountains is 1689 feet. They extend 15 miles in a line from north-east to south-west. The navigation of the Shannon is aided by three lateral cuts or canals, at Medick, Bunagher, and Shannon Bridge. Many steamboats ply on this part of the Shannon.

Climate.—Notwithstanding the great extent of wet ground on the surface of King's County, the climate is neither damp nor unwholesome; it is, indeed, drier than in most Irish counties. This is partly accounted for by the antiseptic quality of the peat bog, and partly by the fact of the county lying comparatively high and open.

Geology.—The *Boetz* limestone of the central plain spreads over the entire area of the county, with the exception of the portions occupied by the protruded masses of the Slieve Bloom chain and the Hill of Croghan. The range of Slieve Bloom consists of a nucleus of clay-slate, supporting flanks of sandstone. Croghan Hill consists of a protruded mass of trap conglomerate, rising about 500 feet above the level of the surrounding country, with steep declivities towards the south. The hill is almost all under cultivation, and yields the most abundant white and green crops without any manure whatever. Massive strata of greenstone appear also between Croghan Hill and Philipstown. Granular limestone occurs at the Seven Churches in the north-west of the county, and has been quarried to the extent of 3000 cubic feet of good gray marble. Banks of rolled limestone gravel, called eskers, occur frequently throughout the *Boetz* limestone district. The bogs, which occupy so large a portion of the county, generally repose on limestone gravel.

Products, &c.—The soil in general is of average fertility, and can be made to yield very good crops in the arable districts by manuring with the lime and bog-stuff which abound throughout the county. The banks of the Shannon, where they are occasionally overflowed, afford considerable tracts of fine pasturage. The chief grazing districts in the county lie on the borders of Westmeath, where the land is considered very favourable to wool-growing. The principal crops are wheat, barley, oats, and potatoes.

The linen manufacture is carried on to a small extent; and there is a little weaving of friezes, stuffs, and serges. Distilling, brewing, and corn-grinding occupy a few hands. The occupations of the inhabitants, however, are chiefly agricultural, the manufactures being only for home consumption.

The Grand Canal traverses the county from Edenderry in the east to Shannon harbour in the west. The Athlone extension of the Great Southern and Western Railway runs through it from north-west to south-east, passing through Portarlington, Tullamore, and Clara; and in the south there is a branch of the same railway from Roscrea to Parnestown. The chief town is Tullamore.

History.—Although not reduced to shire-ground as one county until the time of Mary, King's County was partially included in other shires at a very early period. In 1537 the Act was passed which erected the whole into one

county under its present name. Before that period it was generally designated Western Glenmalery, to distinguish it from Eastern Glenmalery, the present Queen's County. The native chieftains for a length of time struggled against the new settlement, until 1600, when the lord-deputy, Mountjoy, and Sir Oliver Lambert succeeded, after a deplorable destruction of life and property, in finally reducing them. King's County, like others, was involved in the rebellion of 1641, and extensive confiscations followed.

The ruins of the seven churches of Clonmacnoise, in the north-western part of this county, form one of the most interesting groups of ecclesiastical remains to be met with in Ireland. The buildings are of various dates, from probably the seventh century to the twelfth. Surrounding the Abbey of St. Kieran of Clonard is the ancient burying-ground, containing about two Irish acres, and occupied with the sites and ruins of various religious houses. The whole is inclosed with a wall, at two of whose angles ancient round towers are placed. The buildings within the precincts are chiefly chapels erected over family burying-places by the various Irish kings and chieftains. There are the remains of several other religious houses in the immediate vicinity. The entire group occupies a gently swelling bank rising from the Shannon about midway between Shannon harbour and Athlone. Many other religious houses are enumerated, besides numerous remains of feudal castles, chiefly of the Elizabethan era, of which those of Cloghan, Leap, and Birr are still inhabited.

KING'S EVIL. See EVIL. THE KING'S.

KING'S LYNN. See LYNN.

KING'S YELLOW, a famous yellow pigment, otherwise called *orpiment* (from the Latin name *auri-pigmentum*), a combination of tersulphide of arsenic and arsenious acid. The more the arsenic predominates the more orange is the tint of the pigment.

KINGSLEY, REV. CHARLES, clergyman, poet, and novelist, was born 12th June, 1819, at Holme Vicarage, Dartmoor, Devonshire. His father, the Rev. Charles Kingsley, was an educated gentleman of old family, and his mother, a West Indian lady, was remarkable for her poetic admiration of nature and her great practical and administrative ability. Charles spent his early years first in the Fen Country at Barnack, then at Clovelly in Devonshire, and afterwards at Chelsea. He studied at King's College, London, and afterwards, in 1838, entered Magdalen College, Cambridge, where, after distinguishing himself in classics and mathematics, he took his degree in 1842, and the same year was ordained a deacon by Bishop Sumner and appointed to a curacy at Eversley in Hampshire. In January, 1844, he married Fanny, daughter of Pascoe Grenfell, and in May the same year he succeeded to the living of Eversley, of which place he remained rector until his death. In 1848 he published his first work, a poem entitled "The Saint's Tragedy," dealing in a dramatic form with the story of St. Elizabeth of Hungary, to which a preface was written by the Rev. F. D. Maurice. In 1849 he published a volume of "Village Sermons," a series of plain-spoken, earnest discourses enforcing the translation of religion into daily life. At this time there was great political and social excitement in connection with the Chartist movement, and Kingsley, in association with Maurice and others, laboured zealously to ameliorate the lot of the labouring classes and to guide their enthusiasm in a right direction. Two works bearing on these subjects were published by Kingsley—"Yeast, a Problem," in 1848, and "Alton Locke, Tailor and Poet," in 1850. He was also the author of numerous pamphlets and letters under the signature of Parson Lot, and he materially assisted Maurice in the starting of some schemes of co-operation, the movement being known by the name of "Christian Socialism." In 1853 he published in *Frazer's*

Magazine an elaborate historical novel, entitled "Hypatia," in which he depicted in a vivid manner the contest waged at Alexandria in the fifth century between Christianity, paganism, and philosophy. This work cost him immense labour, and though it raised against him many enemies from among the High Church party, it has ever since been valued as one of the best of his works, and has been translated into German, Dutch, and modern Greek. In 1855 there appeared "Westward Ho," a tale of the Spanish Armada and of adventures in South America. This work, in addition to being a brilliant study of a stirring historical period, contained such graphic descriptions of South American scenery as to awaken the surprise of Humboldt, who could hardly believe that Kingsley had never been to South America. In 1857 he published "Two Years Ago," and in 1859 he was made one of the chaplains-in-ordinary to the queen. In 1860 he was appointed professor of modern history at Cambridge, a post which he retained until 1869, in which year he was made Canon of Chester. In 1869 he started on a journey to the West Indies, returning the following year and publishing a record of his impressions in 1871 in the work entitled "At Last." In 1873 he was appointed Canon of Westminster, and the same year paid a visit to North America, where he was received with enthusiasm, returning to England the following year. He died at Eversley after a short illness, 23rd January, 1875. In addition to the books already mentioned, Kingsley was the author of numerous other works, among the best known of which are "Sermons on National Subjects" (first series, 1852; second series, 1854); "Alexandria and her Schools" (1854); "Andromeda, and other Poems" (1858); "Water Babies" (1863); "Hereward the Wake" (1866); "Madame How and Lady Why" (1869); and "Westminster Sermons" (1854). He was also a true poet, and some of his short lyrics are among the best known and cherished poems of modern times. His longer poems are hardly so well known as they deserve.

Kingsley was possessed of wide and varied information, took a keen delight in most branches of natural history, and entered with hearty enthusiasm into many open-air sports and recreations, advocating both by precept and practice what has been termed muscular Christianity. An earnest social reformer, and at the same time a devout and thoughtful Christian, he made it his aim to show that there was nothing incompatible between the Christian life as its Founder taught it and the innocent enjoyment of the best gifts of the Creator; and further that it was the first duty of every conscientious man to use his powers to the very utmost in the service of his fellow-creatures—his own life being a beautiful exemplification of his teaching.

A valuable and interesting biography, entitled "Charles Kingsley; his Letters, and Memories of his Life," by his widow, was published in 1876 (London, two vols. 8vo), which has since passed through numerous editions. An abridged edition, also in two vols., has likewise had a wide sale, and a popular edition in one vol. was issued in 1884.

KINGSTON, the chief town of the island of Jamaica, is a considerable city, governed by a mayor and corporation. It stands on a gently rising plain, bounded on the north by the Blue Mountains and on the east by a narrow ridge or spur proceeding from them, and is regularly built, and contains many good houses, churches, charitable institutions, two synagogues, and schools. A market and landing-place were erected in 1872, and form with their dwarf sea wall and parapet an ornamental feature of the city. The greatest part of the produce of the southern districts is sent here, and hence exported to Europe or America. The population in 1881 was 35,000. There is a railway from Kingston to Spanish Town. The harbour, a land-locked basin, available for the largest ships, is inclosed southwards by a long tongue of land, at the extremity of which is Port Royal, once the capital of the island. An iron lighthouse is

erected on Morant Point, in lat. $17^{\circ} 56' N.$, lon. $76^{\circ} 11' W.$ Kingston was founded in 1693, in consequence of the destruction of Port Royal by an earthquake; but it was not incorporated till 1802. It was constituted the seat of a bishopric in 1856. A large part of the city was destroyed by fire in 1882.

KINGSTON, a city of Ontario, Canada, on the site of Fort Frontenac, in the north-east extremity of Lake Ontario, at the mouth of the Cataraqui, and at the terminus of a branch of the Grand Trunk Railway, 165 miles E.N.E. of Toronto. Its population in 1881 was 14,091. It was the seat of government in Canada from 1840 to 1845; and next to Quebec and Halifax it is the most important military station in British America.

The city covers a large surface, and has many elegant buildings, large shipbuilding yards, iron-foundries, and manufactures of steam engines and agricultural implements. It is the chief seat of the trade between Upper and Lower Canada, and the harbour is deep and spacious, and has a long row of wharves provided with elevators of the most powerful kind; it is sheltered by Wolfe and Garden Islands. There is also an extensive trade with steamers on the lake, the St. Lawrence, and the Rideau Canal.

In 1862 Kingston became the seat of the new colonial bishopric of Ontario. In the city are the Queen's University and College, incorporated in 1841, which has faculties of theology, law, and medicine, seventeen professors and lecturers, and an average of about 150 students; a county grammar-school, and many private educational establishments, and the provincial penitentiary.

KINGSTON-ON-THAMES, a market-town and municipal borough of England, in the county of Surrey, $12\frac{1}{2}$ miles from London by the South-western Railway, 14 miles by road, is situated on the south bank of the Thames, in an agreeable and picturesque neighbourhood. It is a place of great antiquity. A great council was held here in 838, and the Anglo-Saxon kings were crowned from Edward the Elder (900) to Ethelred (978) on a stone, which is still carefully preserved in the market-place, and from which the town derives its name. It figured in Sir Thomas Wyatt's insurrection in the first year of Queen Mary, and was the scene of the first and last skirmishes (1642-48) in the great Civil War. Its first charter was granted by King John. It is now a quiet but prosperous town. There are flour, cocoa-nut fibre, and oil mills, and brick and tile works. The grammar-school was established by Queen Elizabeth. It counts the historian Gibbon among its *alumni*. It was rebuilt in 1878. The town-hall, an Italian building, and the court-house are in the market-place. The bridge across the Thames, a stone structure of five arches, was built in 1825. St. Peter's Church is a Norman pile of indifferent design, erected in 1842. St. Mark's was built at the cost of the Baroness Burdett Coutts. The old parish church, one of the largest in Surrey, is dedicated to All Saints. It is entirely perpendicular, and of great architectural interest. The tower was raised in 1708, and the whole building well restored in 1862. The brasses and monuments are very valuable. There are several denominational chapels. Numerous elegant villas have been erected at Surbiton and along the river bank. The Chelsea and Lambeth water-works companies obtain their water supply from the Thames at this point, it being prohibited to take water from the river for the use of the metropolis lower down. The population of the municipal borough (which is divided into four wards) was 20,648 in 1881. On the opposite side of the river are Hampton Court Palace and Bushy Park.

KINGSTON-ON-HULL. See HULL.

KINGSTOWN, a seaport of Ireland, in the county of Dublin, situated on the south coast of Dublin Bay, 6 miles south-east of Dublin by railway. It was formerly called

Dunleary, but the name was changed to **Kingstown** in commemoration of the visit of George IV., who embarked here for England after his tour in Ireland in 1821. It has a fine site on rising and broken ground, and is a favourite resort of the citizens of Dublin. There are considerable imports and exports, and the harbour, inclosed by a large pier, has an area of 251 acres. It is the chief steam-packet station, and has railway communication with Dublin. The population in 1881 was 18,230.

KIN'KAJOU (*Cerculeptes caudicollis*) is a carnivorous animal belonging to the Raccoon family (Procyonidae). In the genus *Cerculeptes*, of which the kinkajou is the sole representative, there are thirty-six teeth; there are twelve incisors and four short and blunt canines. The premolars are three on either side of each jaw; they are pointed and conical in shape. There are two molars on each side in each jaw, having flattened crowns, slightly tuberculated. Clavicles are present in a very rudimentary condition. The head is broad and rounded, with short ears. The tongue is long, slender, and extensible. The body is long and weasel-like, and terminates in a long prehensile tail, which is longer than the body. The limbs are short; the feet are plantigrade, and furnished with five toes. The kinkajou is about the size of a domestic cat, and is covered with yellowish woolly fur. It feeds on different kinds of fruit, honey, eggs, small birds, and mammals, is a native of the tropical parts of South and Central America, and is of an extremely gentle and playful disposition in captivity. Of reclusive and solitary habits, the kinkajou lives for the most part among the branches of trees in large woods or forests, and is in every respect well adapted for climbing; being, however, decidedly nocturnal, it is but little exposed to the observation even of those who sojourn among the places frequented by it. During the day it sleeps in its retreat, rolled up like a ball, and if roused appears torpid and inactive. As soon, however, as the dusk of evening sets in it is fully awake and active, displaying the utmost restlessness and address, climbing from branch to branch in quest of prey, and using its prehensile tail to assist itself in its manoeuvres.

KIN NOR, one of the most ancient Jewish instruments, being mentioned in Genesis, as well as later books, but not very clearly to be now defined, except as certainly a string-instrument of some kind. In Genesis iv. 21 we read, in the Authorized Version, of Jubal, "the father of such as handle the harp (*kinnor*) and the organ (*ugab*);" but the German version gives the same passage with more force than eloquence as "Jubal, from whom descended all fiddlers and pipers." It is the *kinnor* which is spoken of in the beautiful Psalm cxxvii., beginning "By the rivers of Babylon, there we sat down, yea, we wept, when we remembered Zion; we hunged our harps (*kinnor*) upon the willows in the midst thereof," and indeed, generally, harps in the Authorized Version means the *kinnor*.

All circumstances point to this being a Syrian instrument in origin; a triangular lyre rather than a harp proper; formed by two (not three) pieces of wood joined at an angle, and thus presenting two sides of a triangle, the first of the strings completing the figure. Eight or nine catgut strings are found on such instruments in ancient wall-decorations, and the players held them on or under the left arm, playing them with the fingers or with a plectrum of ivory.

KINO is the hardened juice obtained by incisions in the bark of the bastard teak tree of India, *Pterocarpus Marsupium*. It is an astringent substance resembling catechu, and is often used internally in diarrhoea, as a gargle in relaxed throat, and as a topical application to ulcers. It is also used in the manufacture of wines, but appears to be at present too expensive for use in tanning and dyeing. The tree belongs to the order LEGUMINOSÆ; the trunk is 2 or 3 feet in diameter, the leaves are pinnate,

and the flowers small and pale yellow. The pod is winged and bent on itself in growth, so as to become round and pouch-like, and hence the specific name *Marsupium* (a pouch). This is the ordinary commercial kino of the present day, but it was originally obtained from a West African tree (*Pterocarpus crinaceus*), and first introduced by Dr. Fothergill in 1757. Mungo Park sent specimens of this tree to England in 1805. Other varieties of kino are obtained from *Butea frondosa*, *Coccoloba urujira*, and from species of *Eucalyptus*.

KINROSS, a small inland county of Scotland, bounded E. and S. by Fifeshire, and W. and N. by Perthshire. Its greatest length east to west is 12 miles, and its greatest breadth north to south is 10 miles. The area is 78 square miles, or 50,560 acres. In 1881 the population was 6697.

The borders of the county are hilly, but the interior, comprising about one-half of the whole, forms a natural hollow round Loch Leven, based on coal and limestone rocks. The soil is various, chiefly inclining to sand and gravel. Some portions consist of a clayey loam and are tolerably fertile, but in the more elevated parts the surface consists of moorland, and forms excellent pastures. Throughout the county the land is well cultivated; but the soil is least fertile where it rises towards West Lomond Hill, which is on the Fifeshire side, 1727 feet high. The better lands are inclosed; and oats, barley, and turnips are the chief crops. The climate, though cold, owing to the general elevation of the land, has been rendered much drier by an extensive system of drainage.

There is some coal in the south, where the county borders on Fifeshire. There are also freestone quarries of good quality in that quarter. To the north of Kinross red freestone is the geological formation of the district. The higher hills are whinstone or basalt. Some cotton and woollen goods are made, but the manufactures are unimportant.

This county contains several fresh-water lakes, some of which are well stocked with pike and the rest with perch, eel, and other fish. Of these lakes the principal is Loch Leven, which, although inferior in magnitude and picturesque beauty to Loch Lomond, is still a noble piece of water, covering a surface of nearly 3300 acres. Its height above the level of the sea is about 360 feet. Its greatest depth is from 80 to 90 feet, and its natural circumference about 14 miles, but a partial drainage has reduced it 3 miles. It contains several islands, on one of which, in its midst, called Castle Island, Mary Queen of Scots was imprisoned in 1567-68, and signed her abdication on 4th July, 1567, and from which, on 2nd May, 1568, she made her escape, shortly before the battle of Langside. The lake abounds in fish, among which the excellent gray trout is highly prized.

The chief streams are the Garry, the South Queich, and North Queich, all of which fall into Loch Leven. The waters flowing from the loch form the river Leven, which, after a course of about 14 miles, passing through a part of Fifeshire, falls into the Frith of Forth at Largo Bay.

Kinross was included in Fifeshire down to 1426. It is the smallest but one of the Scottish counties. There is a ruined castle at Burleigh. The county is divided into four whole parishes and portions of three others, has one prebtery, in the synod of Fife, and one small-debt court.

Kinross, the chief town of the above county, is situated on the western shore of Loch Leven, 19 miles N.N.W. from Edinburgh. The lower part of the town is mean, but it rises towards the north, where there are many handsome houses. There is a modern parish church, a county hall, and town-hall, &c. There are also a Free church, two United Presbyterian churches, and an Episcopal church. Some manufactures of cotton, tartan shawls, plaids, and damasks are carried on. The town communicates by railway with Dunfermline, Stirling, and the North

British line. The population of the entire parish of Kinross at the census of 1881 was 2492; within the limits of the town, only 1960.

KINSALE, a market-town of Ireland, in the county and 13 miles S.S.W. of Cork, is situated on the left bank of the estuary of the river Bandon, in which is formed Kinsale Harbour, which is 2 miles long, with an average width of half a mile, and a depth of from 6 to 8 fathoms and 14 feet at the entrance at low ebb-tide; it is safe for every kind of vessel, but from its proximity to Cork, with which it is connected by railway, it has little trade, except from its fishery. The town is built on the acclivity of a hill, and many of the streets are very steep. The parish church is an ancient conventual structure. The other public buildings are—a Roman Catholic chapel, a convent, Carmelite friary, two Methodist meeting-houses, a town-hall, workhouse, assembly-rooms, and barracks. The fishermen are esteemed the most skilful of any in Ireland, both in their own calling and as pilots. Kinsale is the principal station of an extensive fishing company.

Kinsale is a place of some note in Irish history. It was taken in 1601 by the Spaniards, but was retaken during the same year. James II. landed here in March, 1689; but it was taken by the troops of William III. under the Earl (afterwards Duke) of Marlborough in the following year. It gives the title of premier baron of Ireland to the family of De Courcy, whose representative has the privilege of wearing his hat in the presence of royalty. Prior to the Redistribution of Seats Act of 1885 Kinsale returned a member to the House of Commons. The population of the town in 1881 was 5998.

KINTORE, a royal burgh of Scotland, in the county and 13 miles north-west of Aberdeen, and 552 from London. It is situated in the peninsula formed by the Don, the burn of Tuach, which joins the Don on the right bank, and the Torry Burn, which flows into the Tuach. The town consists chiefly of one street, and contains a parish church and a Free church. There is a bridge over the Torry Burn. The burgh, which comprehends the town, contained in 1881 a population of 661 persons; the whole parish had a population of 2327. The burgh claims to be the most ancient in Scotland, and gives the title of earl to the Keith family.

KINTYRE. See CANTIRE.

K'OSK or KIOSQUE, a Turkish word for an open pavilion or summer-house supported by pillars.

KIRBY, REV. WILLIAM, an eminent English entomologist, was born at Witleham in Suffolk, 19th September, 1759. He was educated at the grammar-school of Ipswich, from which he went to Caius College, Cambridge. In 1781 he took his degree of B.A., and the following year took orders and became curate of Barham in Suffolk. Here he remained curate for fourteen years, and in 1796 was appointed rector, and he retained this position to the end of his life. While conscientiously performing his duties as a clergyman he devoted his spare time to the study of natural history, botany and entomology being his favourite subjects. His first important work was his "*Monographia Apium Angliæ*," or history of English bees (two vols. 8vo, 1802), the publication of which introduced him to a correspondence with Latreille, Fabricius Illiger, Walkenæer, and many other distinguished naturalists of France and Germany. In 1805 he formed a friendship with Mr. Spence, and the two friends united in the production of an "*Introduction to Entomology*" (four vols. 8vo, 1815-26; seventh edition, 1856), a work which has not only enjoyed great popularity in England, but has been translated into French and German. Kirby contributed many important papers to the *Transactions of the Linnean Society*, to the *Zoological Journal*, and other periodicals, and in 1830 was chosen as writer of one of the Bridge-water treatises, his work being entitled "*Habits and In-*

instincts of Animals." He was honorary president of the Entomological Society of London, fellow of the Royal, Linnean, Zoological, and Geological Societies, and honorary member of several foreign societies. He died on the 4th of July, 1850. (See "Life" by Rev. John Freeman, London, 1852.)

KIRCHER, ATHANASIUS, a very learned Jesuit father (1602-80), was born at Geisa, near Fulda. He was educated at the Jesuit College in the latter place. He first rose into notice as professor of mathematics and natural philosophy in the Jesuit College at Würzburg. The Thirty Years' War drove him from Germany in 1631, and he retired to Avignon, where the order had a principal house. Hence he was called by Cardinal Barberini to the headquarters of the Jesuits in the Collegio Romano at Rome as professor of mathematics and of Hebrew. He was extremely erudite, and his learning extended to many curious subjects. His imagination was even more extensive than his learning. The famous Kircherian Museum at Rome is due to his origination, and for this at all events we should be grateful. His most extraordinary work is that on the Egyptian hieroglyphics (in four vols. folio), a subject on which, of course, absolutely nothing was then known. It is a mass of curious speculation—all now proved to be utterly wrong, but was of value in its time as first suggesting the possibility of a rational explanation of them, and regarding them as some form of writing. His best work is certainly the famous "Musurgia Universalis" (Rome, 1650), which, amid speculations frequently not more valuable than those so liberally set forth on hieroglyphics, contains matter on the nature of sound and the theory of musical composition interesting in itself, and doubly valuable as preserving in the form of illustrations many fine contemporary compositions. It is amply shown by Meibom, however, that a section on the music of the ancient Greeks must have been written without consulting one Greek author. Kircher's speculations on obelisks, on the tower of Babel, on Noah's ark, &c., are all as daring and as baseless as those on hieroglyphics.

KIRGHIZ, a nomadic people inhabiting the steppes near, and north and north-east of the Aral Sea. They belong to the Turko-Tartar or Altai race, and their two principal divisions coincide with the surface of their territory, the Kara-Kirghiz dwelling in the uplands and the Kazaks in the plains. The former inhabit the valleys of the Thian-Shan, the Altai, and Pamir mountains, and the latter the Steppe for nearly 500,000 square miles—a tract of country, that is, between the Oxus and Irtysh the size of England, France, and Spain. The pure Kirghiz speak the purest dialect of the Tartar language. They originated from several Turkish tribes and families who, towards the end of the fifteenth century, fled from the tyranny of their rulers to the neighbourhood of Lake Balkash. Reinforced by other tribes they soon became a powerful community, and were known by the neighbouring tribes as Kazaks. During the sixteenth century they increased to 1,000,000 of men, with 300,000 warriors; and in 1598, their khan, Tövekel, subdued the other tribes of Turkestan and Tashkend, where the dynasty was maintained till 1723. In this period of their rule they were attacked by the Khan of Dzungaria, and since that time the Kazaks have been divided into the Little, Middle, and Great Hordes, each of which is subdivided into races, tribes, clans, *auls* or encampments, and tents. The word *horde* is the Russian *orda* and the Turkish *ordu* or *urda*, a camp or citadel; the Great, Middle, and Lesser Hordes are called, in the speech of the Kirghiz, Ulu-juz, Urta-juz, and Kitchi-juz. In the beginning of the present century another horde, called the Inner Horde, was formed by the westward movement of 7000 of the Lesser Horde into lands left vacant by the Kalmycks; they settled in the country between the Ural and the Volga, and thus became Russian subjects. The same

process which has brought so many frontier nations and tribes under Russian sway took place in the case of the Kirghiz. Hard pressed by Nadir Shah and other enemies they sought the protection of Russia, which was extended towards them. The investiture of the khans by Russia now took place, and thus the freedom of election by the people came to an end, and a separation of interests between them and the aristocracy was effected, as in the case of the Cossacks. The Russian government seldom appointed the chief whom the common people would have chosen; and from this cause arose all the troubles which enabled Russia to press still onward into the steppe, supporting her own nominee, and putting down opposition by force. The khanate was abolished in 1821, but it was not till 1845 that the advance of the Russians along the valley of the Jaxartes brought all the tribes into a complete though somewhat restless subjection.

The Russians from their first intercourse with the Kirghiz treated them as though they were Mohammedans, built mosques for them, and sent mullahs among them, though they were really pagans and professed Shamanism; had they known, it would have been easier to have brought them to profess Christianity. Owing to this unfortunate mistake they are now mostly Mohammedans, while they still practise many pagan rites. Though of pure Turkish origin, they are now as much of Mongolian as of Turkish type, especially among the higher classes, and more especially among the women. This is said to be mainly due to the men choosing Kalmyck women for their wives, rather than those of their own race.

Though generally considered to be trustworthy, the Kirghiz are said not to be very hospitable. They are distinctly pastoral, having no fixed station except in winter, and their dwellings consist of rude tents composed of wooden trellis-work covered with felt, having an opening at the top serving at once for window and chimney; the dimensions average about 30 feet in diameter and 12 feet in height; the ground (bare earth) is covered with felt or carpeting, the inside is hung with straw mats or red cloth, and the furniture consists only of a few boxes and warlike implements. The men take the most violent exercise, being often almost wholly on horseback for days together, but in the height of summer, and during the winter, they spend their time in listless indolence, sleeping, drinking *koumiss*, their favourite beverage, and listening either to stories or the rude music of their national instruments, a reed pipe and a rude kind of violin. Household labour and tillage are undertaken wholly by the women, who, as in other parts of Asia, are treated almost like slaves.

Their food is very simple, consisting almost altogether of the flesh and milk of their flocks and herds. Bread is not known, but *balamik* or porridge, made of millet, rye, or wheat, is in common use. The favourite drinks are the *koumiss*, a whey made from mares' milk, and a spirit distilled from *koumiss*, alleged to be both strong and palatable. The dress of the people is long and full, and to European notions little suited for horse exercise, in which they are chiefly engaged—two or more *chapanes*, or loose gowns of velvet, silk, or cotton, according to rank; a leathern belt fastening the robe and securing a knife and tobacco bag, and a round cap surmounted by another when abroad, of felt or other warm materials, conically shaped, and with broad flaps. Very full and highly ornamented trousers are worn by the men over the gown, which is tucked underneath, and large, pointed, high-heeled boots complete the costume. The heads of the men are usually kept shaved, with the exception of a forelock; but those of the women are adorned with long plaits running down the back. The female costume, in other respects, differs little from that of the men. The authority of the khans is only obeyed by their subjects as long as they feel inclined. They may issue orders, but they cannot enforce compliance, and even where there

is an absolute infraction of the laws of the Koran, by which they profess to be guided, the delinquent's punishment is more frequently inflicted by private revenge than by the decision of a public judge.

The Large fat-tailed sheep and horses constitute the chief wealth of the Kirghiz. Goats, very similar to those of Tibet, are chiefly used as guides in leading the sheep from pasture to pasture, as the latter will not move without them; their flesh is eaten, and the down concealed under their red shaggy hair is a valuable article of trade. The camels (most of which have two humps, the single-humped variety being too delicate for the climate) are here, as elsewhere in Asia, the chief beasts of burden. Their industries are almost entirely limited to weaving and making articles for domestic purposes, and to metal working for arms and ornaments. Their numbers are estimated as follows:—The Great Horde, in the district about the Issyk-kul, 450,000; Middle Horde, South Siberia and north of Tashkend, 1,100,000; Lesser Horde, between the Ural and Caspian, 1,000,000; the Inner Horde, between the Ural and Volga, 150,000; total, 2,700,000.

KIRKBY-LONSDALE, a market-town of England in the county of Westmorland, 12 miles south-east from Kendal, 270 from London by the London and North-western Railway, is situated on the west bank of the Lune, over which is an ancient stone bridge of three lofty arches. It consists of several streets, the three principal meeting in a central market-place. The houses are well built of freestone and roofed with slate. The church, restored in 1867, is large, divided into four aisles or portions by three rows of pillars, with a square tower 68 feet high. There are also dissenting places of worship and a free grammar-school. In the market-place is a curious antique cross. The manufactures are of coarse woollens, linens, calicoes, and ginghams. The family of Lowther derive their earldom of Lonsdale from this town. The population in 1881 was 1026.

KIRKBY-STEPHEN, a market-town of England in the county of Westmorland, 23 miles north-east from Kendal, and 265 from London on the North-eastern Railway, stands on the left bank of the Eden, and consists principally of one street parallel to the river. The houses are generally good and built of stone. The church is a large Early English building, with a square tower. The town also contains two dissenting chapels, a grammar-school, a temperance hall, and a modern market-house. The population in 1881 was 3157.

KIRKCALDY, a port and royal burgh of Scotland in the county of Fife. It is pleasantly situated on the shore of the Frith of Forth, between Kinghorn and Dysart, 14 miles north of Edinburgh and 413 from London by the Great Northern and North British railways. The town, which formerly consisted of one street running parallel with and close to the sea-beach for more than 2 miles, so that it is sometimes called the "lang town," has now extended greatly, and many handsome villas have been built on the north side. It has also received many additions and improvements in houses and public buildings, and a good supply of water. There are twenty-five places of worship, comprising seven parish churches for the different districts included within the town limits, six Free churches, three United Pre-byterian churches, a Baptist chapel, Episcopal chapel, Roman Catholic chapel, and places of worship for the Independents, Original Seceders, Evangelical Union, Unitarians, and "Christians;" an old town-hall built in 1832, and another built in 1883, two libraries, reading-room, four masonic lodges, and assembly-rooms. The town is well supplied with schools, among which are three supported on an income of over £2000 under Phillips' Trust. The principal parish church was erected in 1807, but the tower is very ancient. The corn-exchange contains a great hall fitted up for meetings and concerts, and

capable of containing an audience of 2000. Many visitors resort to the town as a bathing-place. The harbour has been rendered very commodious, and coal is exported in large quantities, chiefly to places on the coast of Scotland. Corn, potatoes, sheep, and pigs also form large items of exportation to London and various other ports. The foreign imports consist chiefly of flax and timber from Germany and the Baltic. Linen-cloth weaving, flax spinning, yarn bleaching, floorcloth and linoleum making, iron-founding, and machine making are the chief industries. Some pottery works also employ a large number of hands, and there are breweries and brass foundries. The population of the town in 1881 was 23,315; of the parish of Kirkcaldy, including St. James', 8528.

Kirkcaldy, anciently *Kyrc-aldyn*, claims to have been in existence as early as the sixth century. It first obtained a charter as a royal burgh in 1334. This was ratified by Charles I. in 1644. It had attained about this period to considerable wealth and distinction; but it subsequently encountered severe losses, and about the middle of last century it had only two ferry-boats and one coasting vessel. But after the American War its manufactures, commerce, and population steadily increased. It is now governed by a provost and twenty-seven councillors.

Kirkcaldy is the birthplace of Adam Smith, the author of the "Wealth of Nations," born here on the 5th of June, 1723. His father being comptroller of customs at this port, Smith received the rudiments of his education in the parish school; and he afterwards resided here, with little interruption, from 1766 to 1776, occupied in the elaboration of his great work, which appeared in the last-mentioned year. Thomas Carlyle and Edward Irving spent some years in Kirkcaldy.

KIRKCUDBRIGHT, THE STEWARTRY OF, is a maritime county in Scotland, bounded N. and N.W. by Ayrshire, E. and N.E. by Dumfriesshire, from which it is in part separated by the river Nith, S.W. by Wigtownshire and Wigtown Bay, and S. and S.E. by the Solway Frith. Its length east to west is about 48 miles; its breadth varies from 17 to 30 miles. The area is 954 square miles, or 610,343 acres, of which nearly one-third is arable and 8000 under water. In 1881 the inhabitants numbered 42,127. (The pronunciation is *Kircoobry*.)

The coast, except in the upper part of Wigtown Bay, is generally bold and precipitous. The surface of the county is rugged and barren, more particularly towards the sea coast. About two-thirds of the surface are mountainous. The chief elevations are Blacklurg in the north, which rises to the height of 2231 feet above the sea; Cairnmuir in the west, 2392 feet; and Criffel, a detached granite mountain on the shore of the Solway Frith, 1867 feet.

The soil is thin, but improved by shell marl, &c., on the coast and along the rivers, where the best land is found. When well manured the ground is often very productive. Abundance of good marl is furnished by upwards of thirty lakes which dot this county. The largest is Loch Ken, of great length, but extremely narrow. The climate is moist and, except in the uplands, very mild.

The farms throughout the county are of moderate size, with improved buildings, and generally let on nineteen years' lease. Large numbers of cattle (the polled Galloway breed) and hogs are bred and fattened for the Liverpool, London, and other markets. The pastures are excellent. The sheep kept in the moors are mostly black-faced; Southdowns, Cheviots, and Leicesters are numerous in the mountains and common in the lowlands. The small native hardy Galloway nags have been superseded by draught horses of a larger size, though some remains of the pure and valued breed of Galloway horses still exist. The parish of Borgue is noted for its superior honey.

The grain chiefly cultivated is oats. The potato crops are considerable, and constitute a principal article of export

to England, after supplying the inhabitants and feeding a great number of swine. Turnips, wheat, and barley are also grown.

Excellent building granite, porphyry, and graywacke are the prevalent rocks. A little iron and lead has been found; slate, limestone, sandstone, and millstone exist in various parts. Besides the numerous lakes there are two principal streams, the Dee and the Urr. The former has its source near the north-western boundary of the shire, and falls into the Bay of Kirkcudbright. The salmon fisheries on this river are valuable. The Urr rises in a lake of the same name on the borders of Dumfriesshire, and discharges itself into the Solway Frith. The county does not possess any manufacture of importance.

There are some useful mineral springs. Good roads and stone inclosures, called Galloway dykes, are common. Some fragments of an ancient stone dyke or boundary, which was 8 feet broad and 50 miles long, yet remain in the uplands. The county is traversed by the Portpatrick branch of the Glasgow and South-western Railway.

Kirkcudbright was the seat of the Selgovæ and Novantes in the Roman province of Valentia. A Roman way can still be traced across the northern extremity. Drumore, near Kirkcudbright, is supposed to be the site of *Caerbantoricum*.

In the eighth century the present county became part of Galloway, so called from the Irish Scots of Gaelic extraction who settled here. There are many remains of British, Roman, and Pictish camps, and stations, cairns, &c., with a Logan stone in the Kells range; Druid stones at Mennigaff; besides the ruins of New Abbey, Dundrennan Priory, Anworth and Lincluden churches, Kenmuir, Threave, Cardonness, and several other castles.

The condition of the rural population and the state of agriculture in this county up to the end of the last century were very primitive. The principal food, even in the early part of the present century, was chiefly kail and oats ground in querns turned by the hand, and dried in a pot. Before the Reformation it possessed more monasteries than any other county in Scotland. Kirkcudbright is divided into twenty-eight parishes and one presbytery in the synod of Galloway.

KIRKCUDBRIGHT, the chief town of the above county, is situated on the eastern bank of the estuary of the Dee, about 6 miles from the mouth of the Bay of Kirkcudbright, and 98 miles south by west from Edinburgh, and 10 miles from the Castle-Douglas station of the Glasgow and South-western Railway, with which it is connected by a branch. It was anciently a burgh of regality in 1455. The river opposite the harbour is 20 feet deep at neap tides and 400 feet wide. Coal and lime are imported from Cumberland in large quantities, and some timber from abroad. Wheat, oats, potatoes, and other agricultural products are exported. The population of the parish in 1881 was 3479. It is governed by a provost, two bailies, and thirteen councillors. Quarter sessions, stewartry, and small-debt courts are held here; it is the head of a poor-law union, and the seat of a presbytery. The town is well built. Its principal buildings are—a handsome church, court-house, custom-house, volunteer armoury, built in the sixteenth century, and formerly the court-house; the town-hall, built in 1879, and containing a public hall, reading-room, and museum; market-house, water-works, grammar-school, and union workhouse. There are remains of an old castle of the lords of Kirkcudbright in the middle of the town, with several British and Roman works in the neighbourhood. Besides the parish there are Free and United Presbyterian churches, and a Roman Catholic chapel and an Episcopal church. The Dee is spanned by a magnificent iron bridge, which can be opened to allow vessels to pass. Although the harbour is the best in the

south of Scotland, the town has but little trade beyond the employment of a few cotton looms, some shipbuilding, &c. The scenery around the town is very beautiful, the rising grounds on each side of the river, from Tongland to the sea, being embellished with plantations. About a mile distant is St. Mary's Isle, the beautiful seat of the Earl of Selkirk. Education is very cheap, and Kirkcudbright has long been noted for its schools. It has a free school, which is attended by a large number of children, endowed by one of the inhabitants, and called the Johnston Free School.

Kirkcudbright, as already stated, became a royal burgh in 1455, but it claims to be the *Benutium* of the Romans and the *Caer-Cuabrit* of the Novantæ. However this may be, there was a church dedicated to St. Cuthbert existing a short distance from the present town in 1161. In 1300 the old castle was the scene of Edward I.'s court for ten days, and in 1461 the unfortunate Henry VI. remained here for a time after the battle of Towton. Kirkcudbright played a vigorous part in the troubles of the Stuart family, generally on the side of the Covenanters and the Protestants, and the fleet of William of Orange was wind-bound in the harbour for some days in 1689.

KIRK' DALE CAVE. This cavern in the oolitic limestone, not far from Kirkby Moorside in Yorkshire, is remarkable for a great quantity of bones, chiefly of extinct animals, which were found in it, and which gave occasion to the publication of Dr. Buckland's geological work, the "*Reliquiæ Diluvianæ*." It was discovered in 1821, and had a nearly level floor, parallel to the limestone strata. Its extent was 245 feet; the height varied from 3 to 6 feet or more. On the rocky floor was generally a bed of mud, covered over by an irregular layer of sparry stalagmite, formed by the dropping of water containing carbonate of lime in solution, and it was in this stalagmite and in the mud below it that the bones were found. Of the animals to which the bones belonged six were Carnivora—hyæna, felis, bear, wolf, fox, weasel; four Pachydermata—elephant, rhinoceros, hippopotamus, horse; four Ruminantia—ox, and three species of deer; four Rodentia—hare, rabbit, water-rat, mouse; five Birds—raven, pigeon, lark, duck, snipe. The bones were almost universally broken. The remains of hyænas were the most abundant of all the bones; their teeth were found in every condition, from the milk tooth to the old worn stump.

KIR'KE (Gr. *Kirke*). See CIRCLE.

KIRK' HAM, a market-town of England, in the county of Lancashire, in the Fylde, 218 miles from London, is the chief place in a rich agricultural district. The Preston and Lancaster Canal passes near it; there is also a branch railway to it from the Preston and Wyre Railway. It is small, but neat and well built. The church was rebuilt in 1822, but the ancient tower of Norman architecture remains. There are a free grammar-school, and several well-endowed charities and schools. Sailcloth, sacking, cordage, flax, and cotton are manufactured here. Population of the parish, 16,997; of the township, 3810. In the neighbourhood a fight took place in 1644 between the Royalists and the Roundheads, in which the former were defeated. The vicinity is rich in its association with the myths of the Fylde country.

KIRK-ROAD is the name given in Scotland to a path used by the inhabitants of country districts for the purpose of attending the services of the church. Where the ancient use of such a path can be established it amounts to a right of way, and the proprietor of the land may be restrained from closing it against the public.

KIRK-SESSION, in Scotland, is the name given to the lowest court of the Presbyterian churches. It is composed of the ministers and elders of a parish or a particular congregation, and it has the power of suspending or restoring any member in respect to the privileges of the church.

From its decision an appeal lies to the presbytery, and from thence to the Provincial Synod and General Assembly. All questions concerning discipline must originate with the kirk-session. In former times fines were sometimes exacted from members of the church who had been guilty of breaches of discipline, though the kirk-session had no legal authority to enforce payment, but the practice has fallen into disuse and is hardly likely to be revived.

KIRK WALL, a royal burgh of Scotland, situated on a bay on the north coast of Pomona, is the capital of the Orkneys. It is about 40 miles north of Wick, 240 from Edinburgh by water, was formerly the seat of a bishopric, and is still a royal and parliamentary burgh and port. It was first chartered in 1486, and is governed by a provost, two bailies, and seven councillors. The parish is properly called Kirkwall and St. Olla, the latter from a church erected in memory of Olaf the Holy, who was killed in 1030. The principal modern buildings are the town-hall, county buildings, the offices of the Commercial Bank, assembly rooms, museum, grammar-school, libraries, custom-house, and Episcopal church, which was built in 1879, and suffered severely from fire in 1881, a Free church, U.P. church, Congregational church, and a Roman Catholic church. The Cathedral of St. Magnus is still one of the most remarkable specimens of middle-age architecture in Scotland, though it has perhaps received more than the usual ill-treatment and neglect from the responsible authorities of various times, and the choir, which is used as a place of worship by the Established Church, is disfigured by a screen to separate it from the nave. It is a fine cruciform building, in mixed Norman and Gothic, 226 feet long, with a tower 133 feet high, resting on stout Norman pillars, and has a fine east window. It was erected in 1138 by Olaf, king of Denmark, and is still in good repair. Close to the cathedral are the ruins of the Bishop's Palace, in which Haaco, king of Norway, died in 1263, soon after losing the battle of Largs, and of the palace of Earl Patrick Stewart, the last feudal earl of Orkney, who was executed for high treason in the reign of James I. The old town consists of one long narrow street, but the newer part contains several good houses and shops. It has a considerable trade in the produce of the island. There is a pier, built on iron screw piles, extending 500 feet, and completed in 1867. Steamers and packet boats run to Aberdeen, Lerwick, Leith, Granton, and Wick. The principal articles exported are fish, beef, butter, tallow, hides, skins, oil, feathers, linen goods—which are manufactured here—and some corn. Kirkwall is the seat of the superior courts of law for the Orkneys. The population of the parish in 1881 was 4801; of the burgh, 2613.

KIRRIEMUIR, an ancient burgh of barony and market-town of Scotland, in the county of and 5 miles north-west from Forfar, and 485 from London by the Great Northern and Caledonian railways. It stands in a pleasant situation, partly on a flat and partly on an incline, along the north brow of a picturesque glen through which the streamlet Garry runs. The Grampians are within 3 miles, and the view from the upper part of the town, which is 400 feet above the sea, is extensive and striking, having this fine range of hills to the north, and the whole extent of the splendid valley of Strathmore to the south. It consists of several irregular but good streets, and has two parish churches, two Free churches, two U.P. churches, a United Original Secession church, and an Episcopal church, a town-hall, and other public buildings of modern date. Coarse canvas and various other brown linens are manufactured very extensively. Population of the town in 1881, 4390; of the parish, 5516.

KIRSCHWASSER (Ger., cherry-water), a spirit made from cherries, and much esteemed in Germany. The cherries, kernels and all, are pounded and broken in a vessel, and left to ferment for some days. The liquor

is then obtained by distillation, and flavoured occasionally with hydrocyanic acid. Kirschwasser is sometimes very absurdly called cherry brandy, but the ordinary cherry brandy is made by making a sort of brandy pickle of cherries stewed in syrup. Real kirschwasser when good is far more like whisky in its nature. It is the favourite spirit with the Alpine guides, but most travellers regret their compliance if they accept an invitation to a pull at the guide's flask, since the coarsest and roughest spirit is usually their choice.

KISH'ENAU or **KICHENEV**, the capital of Bessarabia in Russia, on the Bulk, a feeder of the Dniester, 95 miles north-west of Odessa. When it came into the possession of Russia in 1812 it was a small wretched place, but it has since increased more rapidly in proportion than any other town in the empire, the population being now over 100,000. It covers three hills, has about twenty churches and some handsome public buildings and manufactures of woollen cloth, brandy, and leather, and a very extensive trade in corn, cattle, flax, and hemp.

KISS, a mode of salutation by touching with the lips, so common as a mark of the deepest affection or reverence as to seem almost instinctive to us. In fact, the word adore (Lat. *ad orem*, to the mouth) implies that the object adored, or its image or garments, was to be kissed, or else that the hand was to be kissed and waved as a salutation before the adored one. Men in uncivilized regions kiss the feet of a superior, or kiss the ground before him; in ancient times to kiss the knees or the hem of the garment was humbly to implore protection; to kiss the hand was to pay homage, as of a vassal to his lord or a client to his patron. A curious custom seems to be indicated in Gen. xli. 40, where Pharaoh decrees Joseph his chief minister—the words translated “and according to thy word shall all my people be ruled,” being literally “and thy mouth (that is, the words of thy mouth) shall all my people kiss,” apparently the written proclamations of the powerful ruler being revered in that way by kissing the parchment which bore them. The custom of kissing the foot of a superior, or the ground which it has pressed, is now confined among us to lovers in the worst stage of their fever, and is even then more common upon paper in the shape of poetical exaggeration than in actual fact; but there remains one very famous example in the person of the Pope, to whom his visitors are expected to pay the deepest possible respect by kissing his foot. A bronze seated statue, probably of Jupiter, of fifth-century workmanship, which serves (with due alterations) as a statue of St. Peter in St. Peter's at Rome, has the toe, which projects a little beyond its base, worn away every few years by the kisses of the faithful, and it is as regularly renewed. It is curious to stand near and see the worshippers lightly touch the solid bronze with their handkerchiefs and then kiss it, and to reflect that so slight a touch often repeated produces an abrading effect so remarkable.

But it is not true that kissing is instinctive in man, in spite of the beautiful passage in Steele's essay—“It is certain that nature was its author, and it began with the first courtship.” On the other hand, the Australian “black fellows,” the Maoris of New Zealand, the men of New Guinea, and the Eskimo had no knowledge of kissing until Europeans showed them. Most of these practise the salutation now to a certain extent; but the negroes of West Africa, equally ignorant in the first onset of this graceful action, refuse to adopt it; for some reason what causes so much pleasure to ourselves fills them only with disgust.

The pleasant old Christmas custom of a kiss under the mistletoe is a relic of Norse mythology. Baldur, the bright and beautiful god of light, was slain by a spear whose shaft was a mistletoe twig bewitched by Loki, the malevolent fire-god, until it swelled to the semblance of a spear-shaft, and given by him to the blind Hlodur, who

threw it and hit Baldur unintentionally when the gods were at play. Friga had made everything in heaven and earth swear never to harm the bright Baldur, and had left out the mistletoe as being so slight and weak. Hence the trick of the malicious Loki. But Baldur was restored to life, and then the goddess Friga guarded the mistletoe, which the gods determined could not again do mischief unless it touched the earth—the empire of Loki. That is why it is hung from the ceiling. As friends pass beneath it they give each other the kiss of gladness, as rejoicing in the mistletoe's powerlessness to be again the instrument of strife and discord. The ceremony is like the converse Indian custom of burying the tomahawk at the conclusion of a quarrel.

The word should properly be *koss*, the verb *kiss* being made from that noun by vowel change. Thus in Wyclif's Bible (remembering that in our older tongue *c* had the hard *k*-sound) we read, "And he came to Jhesu to kisse him, and Jhesus seide to him, Judas, with a koss thou bytrayest mannys sone" (Luke xxii. 47). *Kuss* lasted down to Henry VIII.'s time, following *koss*, before it developed into *kiss*. The Teutonic base is *kussa*, and it is the same word which in Latin appears as *gustus*, a taste.

KISS'INGEN, a town of Germany in Bavaria, in the government district of Lower Franconia, situated on the left bank of the Franconian Saale, across which there is a stone bridge here, 32 miles north of Würzburg. It is noted for its saline springs and saline artesian well, 1879 feet deep, with a temperature of 92° Fahr. The water, as well as that of many springs in the valley, is impregnated with carbonic acid, and in some springs with iron. It is a favourite watering-place, and attracts many visitors; large quantities of salt are also made by evaporation. The chalybeate spring of Bocklet is 6 miles up the valley. Kissingen is very picturesquely situated, and is surrounded by wooded mountains. The healing properties of the waters were known as early as the sixteenth century, and the prince-bishops of Würzburg took the place under their protection. At the beginning of the present century, however, Kissingen was still a small unimportant village. The town is visited by large numbers of English. The resident population is only about 2000. Near the town are salt mines, from which 30,000 cwts. of salt are raised yearly. The gambling tables were suppressed in 1818. During the German war of 1866 Kissingen was the scene of several well-contested engagements between the Prussians and the Bavarians. The latter were, however, eventually obliged to yield. The cemetery contains a handsome monument in memory of the Bavarians who fell in the campaign of 1870-71.

KIT, in military language, is a general term for all the regimental necessities of a soldier with the exception of arms, accoutrements, and uniform. Formerly the recruit had to purchase his kit out of the bounty money, but at the present day a free kit is one of the inducements held out to procure enlistment. As the articles become worn out or lost they have to be replaced by the soldier at his own expense; but being manufactured in large quantities, they are supplied at a very low cost.

KIT, a small fiddle, especially used formerly by dancing-masters, who could carry such a small instrument conveniently in the pocket. The word is short for the Old English *cytere*, a general name for instruments of the string class, and coming from the same stem as the Greek *kithara*. In France the use of the instrument supplies its name of *pochette*.

KIT-CAT, a term applied to a Whig political and social club in London, founded about 1698, to which Addison and Steele belonged, so called from Christopher Cat, a pastry-cook who served the club with mutton pies. Sir Godfrey Kneller, a member of the club, painted a series of portraits of all the other members, which were hung up in the room of

meeting. To accommodate the paintings to the height of the walls he was obliged to adopt a new size of canvas; hence "kit-cat" is generally applied to any portrait about three-quarters of the figure in length. The club was dissolved in 1720.

KITCHEN GARDEN. In laying out the grounds of a country residence provision should be made for the site of the kitchen garden. Though it should not obtrude on the ornamental ground immediately adjoining the house, the design of the whole should be so formed as to leave the kitchen garden in the most favourable situation with regard to aspect, soil, and water. The aspect should be open to the south, but sheltered on other sides, more especially from northerly and easterly winds, by rising ground or lofty trees at some distance. The surface should be nearly level, or in some cases, according to the previous nature of the subsoil, it may be quite so; but generally speaking a gentle slope from north to south is best. The soil should consist of a rich loam, neither too light nor so adhesive as to be liable to bind strongly in dry weather. The depth of soil ought not to be less than 2 feet, and more is absolutely necessary for some kinds of vegetables.

Much injury is done to vegetation by watering with cold spring water, or indeed with any water that is much colder than the soil and atmosphere in which the plants are placed. Plants, when not watered at all in dry weather, if they are only kept alive, succeed better when rain does come than others that are watered, or rather chilled with water, at a comparatively low temperature. Water for the kitchen garden should therefore be derived from ponds or large reservoirs fully exposed to the sun, and even these should be supplied by open rather than underground channels.

The quantity of ground which a kitchen garden should contain must be regulated according to the number of individuals which it is required to supply. An acre is calculated to afford a tolerable supply for sixteen individuals, but much depends on the nature of the vegetables required. Potatoes, turnips, pease, and carrots are frequently obtained of better quality and at less expense from a field than from a garden.

The form of a kitchen garden should be composed of straight lines. If rectangular it will prove a saving of labour; for it is practically known that more time is required to trench a piece of ground of a triangular form than if the same extent were in the shape of a square or parallelogram. A range of forcing-houses is generally placed on the north side; and as the wall on that side is the most valuable for fruit trees, on account of its direct south aspect, it becomes desirable that it should be extended as much as possible.

The interior departments of the kitchen garden are usually bounded by fruit trees planted within 2 or 3 feet of the walks. Not only are bushes, such as gooseberries, currants, and raspberries, used for this purpose, but fruit-trees of various kinds. The latter are named either as dwarfs by grafting apples on paradise stocks and pears on quinces, and causing their branches to proceed from near the ground, or as espaliers. They were formerly much more in use for training fruit trees in kitchen gardens than they are at present, as many object to their appearance and others to their utility, as compared with their expense.

Very few of the subjects of kitchen-garden cultivation are indigenous; they are chiefly varieties of luxuriant habits, which are artificially maintained and augmented by the art of the cultivator. The principal means employed for rendering the soil of the kitchen garden subservient to this purpose are—the application of abundance of manure; trenching, digging, and otherwise stirring the soil; and a due rotation of crops. Manure supplied in abundance will generally produce luxuriance in vegetables,

although sometimes a disagreeable rankness is communicated to the flavour. This is in a great measure corrected by trenching, which becomes occasionally highly necessary; and although expensive, it will always repay the cost, if judiciously performed.

It is always advantageous to attend to a proper rotation of crops, especially where manure is not abundantly applied nor trenching performed. One kind of plant should not immediately follow another of the same nature or one closely allied.

KITCHEN-MIDDENS (Danish, *kjokken-møddings*), shell mounds of Neolithic age, found in several places round the coast of the British Isles, Denmark, and Scandinavia. They are composed chiefly of accumulations of mussel, cockle, oyster, and periwinkle shells, with a few bones of fishes, birds, and mammals; polished stone implements, and articles made of bone and wood; also rude pottery. No

indications of man having taken to agricultural pursuits are contained; but the remains of the dog show that he had domestic animals. These mounds are probably the accumulation of ages of the debris from annual tribal feasts.

KITE (*Milvus iclinus*), a bird of the family *FALCONIDE*, was formerly one of the most abundant and familiar birds of prey in Great Britain. It is now all but extinct in the southern parts of England. It is most frequently met with in the lake country of Cumberland and Westmorland, and the south-western part of Scotland. In Ireland it does not seem to be known. Yet in the sixteenth century Clusius states that when he was in London an amazing number of kites flocked there for the offal which was thrown into the streets. They were so tame that they took their prey in the midst of crowds, and it was forbidden to kill them. The scarcity of this bird is due to the extensive clearing of forests and the hostility of



Common Kite (*Milvus iclinus*).

the gamekeeper. The kite measures from 25 to 27 inches in length, including the long forked tail with which it is furnished. The general colour of the plumage of its back is reddish-brown, the feathers being dark brown with broad reddish edges; the head and neck are grayish, and the whole lower surface reddish-brown, as are also the tail feathers. The wing primaries are black. The beak is horn colour, the cere and feet are yellow, and the claws black. The wings of the kite are very long and of immense extent as compared with the body, and from this circumstance and the great power of the tail, the flight of the bird is singularly graceful and easy. This bird sails gracefully in the air, with scarcely a perceptible movement of the wings, using the tail as a rudder; now it wheels round in circles, and now remains stationary with outspread tail. It pounces on its prey, consisting of moles, mice,

leopards, rabbits, unfledged birds, and the young of the game birds especially. It was, when more plentiful than it is at present, a great scourge to the poultry-yard. It will eat frogs, lizards, and snakes, and has been observed to catch fish with great address. A few hundred years back it was undoubtedly the great scavenger of our large towns. The nest is made of sticks, bones, &c., and is lined with soft materials, of which rags form no inconsiderable portion, a fact of which Shakespeare takes cognizance when he writes—

“When the kite builds, look to lesser linen.”

The nest is usually built on the fork of a tree in a thick wood. The eggs are three or four in number, short, oval, 2 inches 2 lines in length by 1 inch 9 lines in breadth. They are of a dirty white, spotted and blotched with

reddish-brown and often lilac. The female lays early in the season, and she often makes a vigorous defence when her nest is attacked. The courage of the kite is usually conspicuous by its absence. It was a favourite quarry in the sport of falconry, but from its size and strength it was beyond the powers of most falcons. Louis XVI. of France and our James I. flew at the kite with powerful falcons. The Earl of Orford, who died in 1791, followed the same sport in England, as recorded by Sir John Sebright. The kite was attracted towards the ground by means of a great owl, to the leg of which a fox's brush was usually attached; this was thrown up into the air within sight of the kite, and the latter, no doubt wondering what strange creature this was, would gradually advance within the proper distance of the hawking party. The owl, having been previously trained, was then brought down to the lure, and a cast of hawks thrown up in pursuit of the kite. This species is spread all over Europe as a summer visitor, wintering in Africa. A smaller species, the Black Kite (*Milvus ater*), is common in the south of Europe and in Africa. It is a useful scavenger, and is remarkable for its impudence.

The genus *Elanus* is closely allied to *Milvus*. The Black-winged Kite (*Elanus caeruleus*) is abundant in India and Africa, and is found, though rarely, in the south of Europe. It is a beautiful species, though small; it is ashy gray above and pure white below. It lives principally on insects, which it takes on the wing. The Swallow-tailed Kite (*Elaenoides furcatus*), remarkable for its length of wing and tail, is spread widely through America. These birds sweep the fields in troops like swallows, and feed on insects, as grasshoppers, &c., small snakes, and other reptiles. Two stray specimens have been taken in this country, one in Argyleshire in 1772, and another in Yorkshire in 1805.

KIT'S COTY HOUSE, a British cromlech of four stones, three upright and the fourth as a roof to them, still standing close to Aylesford in Kent. Lambard, writing in 1570 of "Citscotehouse," says:—"The Britons, returning from the chase, erected to the memoire of Catigern, as I suppose, that monument of four huge and hard stones, which are yet standing in this parish pitched upright in the ground. For I cannot so much as suspect that this should be that which Beda and others do assigne to be the tomb of Horsa." This tradition would make the cromlech that of Catigern (*Cat's cote house*, "coits" being large flat stones, gigantic originals of our "quoits," as in the case of the "Devil's Coits" of Kennet, Wiltshire); and Catigern was leader of the British forlorn hope at that fierce fight at Aylesford where the Britons sought to stay the irresistible advance of the invading English under Hengest and Horsa.

KIT'TIWAKE (*Rissa tridactyla*) is the common name for a bird belonging to the family Laridæ (the gulls). It frequents the British coast at the breeding season, but leaves in winter. It arrives on our coasts in March and departs in October. In Scotland its favourite breeding places are on the shores of the northern Hebrides. It is a beautiful bird. The plumage is full, close, and elastic. The length of the bird is about 17 inches, the extent of the wings 36. See GILL.

KIT'TO, JOHN, the eminent self-taught biblical scholar, was born at Plymouth, 4th December, 1801. Through the intemperance of his father his childhood was passed in poverty, so that he got no schooling worthy of the name. Having, however, through his grandmother's kindness learned to read, he devoured all the nursery literature within his reach. When he was about ten years of age he was set to work as assistant to his father, who was a mason. On the 13th of February, 1817, the little drudge, who was engaged carrying mortar and slates, missed his footing and fell from the roof of a house. Long

he lay in bed afterwards, and by the accident his sense of hearing was completely extinguished. He resorted to various contrivances to gain a livelihood, groping for bits of rope and iron in Sutton Pool, painting heads and flowers, &c. The love of reading still grew upon him, victim though he was of hunger and nakedness, and at length the starved and ragged lad was admitted into Plymouth workhouse. In the workhouse he kept a journal—a curious record of his history and privations. The various writings of the pauper youth began to attract attention; a subscription was made for him; and he left the hospital, in which he had been an inmate for about four years. Mr. Groves, then a dentist in Exeter, took him under his charge as an apprentice; and during his stay at Exeter, and in his twentieth year, he published a small volume of essays. Kitto then went to the Missionary College in Exeter to learn printing, with a view to mission work abroad. He was selected as his field of labour, and there he resided eighteen months. On his return he found Mr. Groves preparing to go as a missionary to the East, and he at once agreed to go with him as tutor to his children. Mr. Groves and his party reached Bagdad on the 6th December, 1829, where Kitto remained till September, 1832. During his stay in Bagdad the city was besieged, the plague broke out and carried off 50,000 of the population in two months, and the river overflowed its banks, throwing down 7000 houses. Kitto came home by way of Constantinople, and arrived in England, June, 1833, having kept a pretty full journal of his Eastern travels. He began at once to write in the *Penny Magazine*, and Mr. Knight engaged him for the *Penny Cyclopædia*. His travels had furnished him with a knowledge of Oriental customs and peculiarities, and he projected the "Pictorial Bible," which was published in monthly parts, and finished in May, 1838. It rose at once into high popularity. The "Pictorial History of Palestine" followed in 1838, the "Christian Traveller," of which a few parts only were published; the "History of Palestine" (1839-40); the "Cyclopædia of Biblical Literature," and the "Lost Scenes" (1845), containing virtually an autobiography of great interest. Then came the "Journal of Sacred Literature" (1848-53), to which he gave much of his time; and finally the "Daily Bible Illustrations," in eight volumes, dedicated to the queen, in 1849-53. But before this work was concluded he had fallen ill to bad health. To secure him some relaxation a sum of money was raised among his friends—a pension of £100 from the civil list having been previously conferred upon him. Broken down and exhausted from constitutional debility and excessive labour, he repaired to Germany, and finally settled at Gmündt on the Neckar, where he died on the morning of the 25th of November, 1854. The University of Gießen conferred upon him, though a layman, the degree of D.D. in 1844, and in the following year he was elected a fellow of the Royal Society of Antiquaries.

KIT'S, ST. See CHRISTOPHER'S ST.

KIUKIANG, a city of China, on the right bank of the Yang-tse, at the outfall of the Poyang Lake into it, 135 miles south-east of Hankow. It has a large river trade. Its chief exports are tea, hemp, and tobacco, and it imports a considerable quantity of Manchester goods, though far less than formerly, and a small quantity of opium.

KIUNG-CHOW, one of the treaty ports of China, the chief town of the island of Hainan. It is the commercial emporium of the island, and has an increasing import trade in opium, English cotton goods, Indian cotton, and kerosene oil.

KI'WI. See APTERYX.

KLAGENFURT. See CLAGENFURT.

KLAPROTH, JULIUS HEINRICH VON, the distinguished Oriental linguist and the son of an eminent chemist, was born at Berlin, on the 11th of October,

1783. He learned Chinese secretly without the help of a master. His father, perceiving that he devoted his time exclusively to Oriental languages, sent him, in 1801, to the University of Halle, to study the classical languages. He remained several years at Halle, when the learned Count John Potocki proposed to him to enter the service of the Emperor Alexander of Russia. Upon his arrival at St. Petersburg, early in 1805, the Russian government being then engaged with the plan of sending an embassy to China, Count Potocki obtained for Klapproth the place of an interpreter. He set out alone, and after having traversed the Ural Mountains arrived at Irkutsk. On the return of the embassy, Klapproth took a solitary route through Southern Siberia, and only reached the Russian capital in the beginning of 1807. Before the end of the year he was sent on a scientific mission to the Caucasian provinces. He returned in January, 1809, with a large stock of information, most of which afterwards formed the subject of separate works and articles in learned periodicals. During his stay in Russia he was active in establishing a school of Oriental languages at Wilna, and in making a descriptive catalogue of the Chinese and Mantchu MSS. in the imperial library at St. Petersburg. He was sent in 1811 to Berlin, to superintend the engraving of the characters which were intended for printing those MSS. In 1812 he tendered his resignation to the Russian government, and after some time received permission to leave. After various vicissitudes and changes of residence, Klapproth finally settled at Paris, where, enjoying an income which enabled him to gratify his love of pleasure and refined society, he exhibited an extraordinary activity, and it was in the years subsequent to 1816 that he published most of these literary productions which established his reputation. After long and painful sufferings he died suddenly, on the 23d of August, 1835.

Klapproth was certainly one of the first linguists of his age. His memory was retentive to an extraordinary degree; he possessed a deep insight into the principles of philological research, and his quickness of perception and critical sagacity were rarely at fault. He composed as readily in French as in German, and has left valuable works in both languages. He was, however, very aggressive in his literary controversies and unjust to other scholars, while in dealing with questions which his vast learning failed to solve he was apt to fall back upon his imagination. His greatest work was the "Asia Polyglotta" (Paris, 1823), and for a list of the others, which are too numerous to be included here, the reader is referred to Merlin's "Catalogue de la Bibliothèque de M. Klapproth" (Paris, 1839), and to the *Nouv. Journ. Asiat.*, vol. xvii.

KLAUSENBURG or **KOLOSVAR**, a town of Hungary, and one of the two royal and free capital cities of Transylvania, is on the Szamos, 73 miles N.N.W. of Hermannstadt. It consists of the old and new towns, and several suburbs. The population is 30,000. The city is the seat of the Transylvanian Diets, of the Unitarian superintendence for Transylvania, and of a Protestant consistory. The chief manufactures are woollens, china ware, and paper. The principal public buildings are—a citadel, a cathedral, Roman Catholic, Calvinist, Unitarian, and Lutheran churches; a town-hall, military and other hospitals; and there are also Roman Catholic, Reformed, and Unitarian colleges, Paucist and other monasteries, and an institute for nobles. The town was the birthplace of Mathias Corvinus, king of Transylvania. It is supposed to be the Latin *Claudia*.

KLAUSTHAL. See **CLAUSTHAL**.

KLÉBER, JEAN BAPTISTE, one of the most distinguished generals of the French Republic, was born at Strassburg in 1753 or 1751. He was brought up as an architect and sent to Paris to complete his studies, but soon left it for Munich, where he entered the military

college of that city. He was afterwards appointed to a sublieutenancy in an Austrian regiment, but after serving seven years he resigned, and in 1783 returned to his native country, where he obtained the position of inspector of public buildings at Belfort in Upper Alsace. On the breaking out of the revolutionary war he enlisted as a private in a grenadier company of volunteers in the department of Haut Rhin, and speedily rose to the rank of adjutant-major. At the siege of Mainz in 1793 he was made brigadier-general. He then served in La Vendée, and took an important part in the victories of Tourfou, Le Mans, and Savenay, but being charged with too great leniency he was removed to the army of the north, where he became general of division. In 1794 he commanded the left wing of the French army at the battle of Fleurus, and afterwards took Mous and Maestricht. When Bonaparte was appointed to the chief command of the army in Egypt he took Kléber with him as a general of division. At the landing of the French at Alexandria Kléber was severely wounded, but he was present at the capture of Jaffa and at the siege of Acre. From Acre he was sent to Nazareth, and gained the victory of Mount Tabor, 17th April, 1799. Left by Bonaparte in command of the army in Egypt he endeavoured at first to withdraw, and agreed to a convention by which he was to be allowed to retire with his army and with all arms and baggage. Admiral Keith, however, owing to his instructions, was unable to ratify this convention; and Kléber, resuming hostilities, fought a desperate battle with less than 12,000 men against a Turkish force of over 40,000 on 20th March, 1800, at Heliopolis. The Turks were completely defeated, and Kléber, advancing upon Cairo, took it by assault, and in the course of a few weeks the French were once more masters of Egypt.

Released from immediate danger he began to direct his energies to the administration of the country, but on the 14th June, 1800, he was assassinated by a Mohammedan fanatic named Suleiman, and with him there perished the hopes of the Eastern expedition. (See Ernout's "Vie de Kléber," Paris, 1867.)

KLEISTHENES. See **CLÉISTHÈNES**.

KLEOMENES, KLEON, KLEOPATRA. See **CLÉOMÈNES, CLÉON, CLÉOPATRA**.

KLEPTOMANIA (Gr. *kleptin*, to steal), the name given to a form of mental disease characterized by an irresistible impulse to steal. Such a tendency is often manifested in connection with other unmistakable signs of insanity, but there are cases where there is but little, if any, sign of brain disorder apart from this particular tendency. The term does not include that low mental and moral condition often observed by prison officials to be inherited by descendants of habitual criminals, for in these cases, although all the moral senses are blunted and imperfect, self-control is not absent. But when persons in good circumstances are found to steal articles of small value, to exhibit no shame when detected, and to be oblivious of the social stain attached to such conduct, it is evident that in these cases there must be a tendency beyond self-control. It is recorded that one of the kings of Sweden was constantly stealing trifles of little or no value, that an English baronet persistently stole scraps of refuse iron or broken crockery, and that a Scottish clergyman, otherwise earnest and devout, stole Bibles which he gave to poor persons. The latter when arrested for one of these thefts was found praying by the bedside of a sick parishioner to whom he had given the Bible, and he both acknowledged and defended his conduct.

From a medical point of view the outbreak of such a propensity is regarded as a serious symptom and as the probable herald of grave disorders. In legal matters the existence of kleptomania apart from other signs of insanity is hardly admitted, and though it has occasionally been

advanced as a defence in cases of theft, it has not been accepted as valid.

KLI'O or **CLIO**. See **MUSES**.

KLIP'SPRINGER (*Oreotragus saltatrix*) is a South African antelope, closely resembling in form and habits the chamois of Europe. The klipspringer stands 21 inches high at the shoulder. The horns are $8\frac{1}{2}$ inches long and curved a little forward. The general colour is olive. The hair on the body is long, and was used for stuffing saddles and mattresses when this antelope was more abundant. The klipspringer occurs singly or in pairs in the most barren and inaccessible mountains of the Cape. The pursuit of it entails the same kind of danger as that which awaits the chamois-hunter amid the Alps.

KLOOTZ, ANACHARSIS. See **CLOOTZ**.

KLOPSTOCK, FRIEDRICH GOTTLIEB, who in the time of his fame was often styled "the German Milton," was born at Quedlinburg in 1721, of respectable parents. In his sixteenth year he went to the school at Naumburg, where his poetical character was first developed. In 1745 he studied theology at Jena, where he projected the design of his "Messiah," and in 1748 the first three cantos appeared. The excitement created by this poem was surprising, and at this distance of time quite inconceivable. No intrinsic merit appears in the poem of such surpassing excellence as to merit the fervour with which it was greeted, and the epithet of a "German Milton" seems to us ludicrously inappropriate. Still there are fine passages in the poem, and it bears occasional and partial reading well. Klopstock composed in 1764 his "Hermannschlacht" ("the battle of Arminius"), which is scarcely so much a drama as a lyric poem in a dramatic form. His other dramas are of a similar lyric character. In 1771 he settled at Hamburg, where he completed his "Messiah." His "Odes" are now generally more read and valued than his "Messiah" or his dramas. He died in 1803.

KLOSTER-ZEVEN, CONVENTION OF. See **CLOSTER-ZEVEN**.

KLUTAINME'STRA. See **CLATINISTRA**.

KNARESBOROUGH, a market town of England, in the county of and 19 miles north-west from York, and 267 from London, with a station on the North-eastern Railway, is picturesquely situated, as its name (*knar*, a rock) implies, on the rocky bank of the swift Nidd, which here pours its waters between high wooded cliffs of limestone. The landscapes in the vicinity are remarkable for their wild beauty, and have derived an additional interest from their association with Lord Lytton's powerful romance of "Engene Aram." The cave to which the name of that sentimental murderer is attached, lies on the east bank of the river, about a mile below the town, and was formerly called St. Robert's, from a famous hermit who died there about 1218. "Blind Jack," or John Metcalf, the great road-maker, was a native of Knareborough. The town, which originally grew up about the castle founded soon after the Conquest by Salvo de Burgh, and now in a ruined condition, is well and neatly built, and contains an endowed grammar-school, the parish and Holy Trinity churches, Congregational, Baptist, Primitive, and Wesleyan chapels, and a dispensary. There are two bridges across the Nidd, one of which leads to the famous Dropping Well, whose waters, being charged with carbonate of lime, produce various fantastic incrustations. The town depends for its prosperity on its limestone quarries, its linen factories, and its great corn-market. The fine cruciform parish church, with Early English, Decorated, and Perpendicular portions, was restored in 1872. Knareborough was plundered by the Scotch in May, 1318. In the dungeons of the castle, which still exist, were confined the four murderers of Thomas à Becket, who took refuge at Knareborough Castle when they fled from Canterbury, the scene of their crime. In 1644, Knareborough made

one of the most gallant defences of the county of York against the Parliamentarians, and only yielded under the pressure of famine. The subsequent dismantling finished the active history of Knareborough Castle, and it was soon afterwards pulled down to prevent further Royalist efforts in that quarter. The Dropping Well is said to have been the locality of the birth of Mother Shipton, the so-called prophetess (sixteenth century). Knareborough was formerly a parliamentary borough, and returned one member up to 1885. The population in 1881 was 5000.

KNEE. See **LEG**.

KNEEL, a mode of ringing a church-bell in single strokes or groups of strokes at considerable intervals, during the passing away of a dying person (hence the term *passing-bell* for knell) or during the approach of a funeral to the churchyard for burial. A single stroke is often made for a child, a group of two for a woman, and a group of three for a man. The word is from the Old English *cnyllan*, to knock or sound noisily. This is the custom enshrined by Shakspeare in the exquisite song of Ariel to the enchanted Ferdinand ("Tempest," i. 2j):

"Full fathom five thy father lies,
Of his bones are coral made,
Those are pearls that were his eyes,
Nothing of him that doth fade
But doth suffer a sea-change,
Into something rich and strange:
Sea nymphs hourly ring his knell,
(Ding-dong,
Hark! now I hear them, ding dong bell."

KNELLER, SIR GODFREY, the famous court painter to no less than six of our sovereigns—namely, Charles II., James II., William III. and Mary II. Anne, and George I., was born at Lubeck in 1648. Vandyck had claimed Charles I.'s court, Lely (a Westphalian) had followed on Vandyck's death, and had been as successful with the Protector as with the unfortunate Charles; and when the Restoration came he painted the gay cavaliers and their ladies literally by hundreds. At Lely's death in 1680, his countryman Kneller stepped into his lucrative occupation. He had arrived at London in 1674; and the good-humoured king, Charles II., amused himself by commissioning a portrait from the young artist and another from the veteran Sir Peter Lely. Lely's generous patron at once made Kneller's fame. Besides his six successive royal patrons in England, Kneller painted Louis XIV. of France, Joseph I. of Austria, and Peter the Great of Russia. The great Marlborough, the infinitely greater Newton and Locke, Pope, Steele, Addison, Congreve, &c., are all known to us as living men chiefly through Kneller's facile pencil. In order to rival the Windsor series of Charles II. beauties painted by Lely, Kneller undertook for his best patron, William III., a series of "Hampton Court" beauties. As both these famous series are now exhibited at Hampton Court, it is very interesting to compare the compositions of the two portrait painters. William was so pleased with this performance that he knighted the artist in 1692. The Emperor Joseph also knighted him. George I. made him a baronet in 1715. Kneller was a man of great parts. Had he been as careful of his fame and as true a lover of art as he was desirous to shine as a wit and man of fashion, with all the lavish expenditure that such a title demands, he could have doubtless produced much finer work than his greediness permitted him to put forth. His vanity was fully equal to his wit, and when he died, very rich, in 1723, it was found that he had paid £500 to Pope to write the highly laudatory epitaph which still figures on his tomb in Westminster Abbey.

KNIGHT, CHARLES, publisher, editor, author, and one of the founders of the cheap periodical press, was born at Windsor, 15th March, 1791. While a young man he edited several publications at Windsor, and in 1823 came

to London, where he started *Knight's Quarterly Magazine*. Of this magazine, to which Præd, Derwent, Coleidge, and Macaulay contributed, only six numbers appeared, but in 1827 Knight became superintendent of the Society for the Diffusion of Useful Knowledge, and in 1828 published under its auspices, *The British Almanack* and the *Companion to the Almanack*. In 1831 he began the publication of the Library of Entertaining Knowledge, to which he contributed himself. In 1832 he commenced the *Penny Magazine*, and in 1833 the *Penny Cyclopædia*. The magazine was discontinued in 1846, the Cyclopædia with its Supplement being completed the same year. Although the circulation of these works was wonderfully large, the excise duty on paper involved him in a heavy loss on both publications. During the issue of these two works he found time and energy for the issue of several other important ones, among which may be mentioned the "Pictorial Bible" (1838); the "Pictorial Shakspeare" (1839); "London Pictorially Illustrated" (1841). These were followed by "Half-Hours with the best Authors" (1847-48); *The English Cyclopædia*, an improved and developed edition of the *Penny Cyclopædia* (twenty-two volumes, 1854-61); and his elaborate and comprehensive "Popular History of England" (1856-62). In 1860 he was appointed publisher of the *London Gazette*, and in 1861 he withdrew from his own publishing business. He still continued his literary activity, however, and issued an autobiography in 1863-65, entitled "Passages of a Working Life during Half a Century"; an historical novel, "Begged at Court," in 1868, and some papers to the *British Almanack* and *Companion*. He died 9th March, 1873. As an author he produced several works of considerable value, but his chief title to honour lies in his unselfish and unwearied efforts in the production and diffusion of popular, pure, and useful literature.

KNIGHT, KNIGHT HOOD (Saxon *cniht*, originally boy, afterwards attendant). Much has been written concerning the origin of knighthood or chivalry, which must be ranked among the most powerful influences of the middle ages; but notwithstanding all the investigations that have been made, there still remains much that is conjectural and uncertain. By some writers the order of knighthood has been derived from the military institutions of ancient Rome, from the court of King Arthur or that of Charlemagne; but the more probable opinion is that which regards it as the greatly modified survival of certain military customs of the Teutonic tribes. In the Anglo-Saxon period the princes and great men gathered round them large bodies of retainers, who in return for protection rendered services of different kinds. It seems probable that the term *cniht*, or attendant, in course of time became restricted to such as rendered military service, and ultimately to such as from their superior rank or wealth attended and fought on horseback, and were called *riders* (German *ritter*; French *chevalier*). After the Norman Conquest, when large tracts of the conquered land of England were allotted to the supporters of the king, these were bound in return to render military service. The estates were again divided into such portions as were equal to the support of a knight, and the king in the first instance, and through the king each subordinate lord, had power to compel the holder of a sufficient extent of land to enter the order of knighthood. In course of time the practice of substituting a payment of money for personal service arose here and there. In fact gradually the conception of knighthood as a personal and social distinction, rather than as compelling military service, gained ground, and this conception was largely affected by the action of the church. In the mediæval period the advance of Mohammedanism was regarded as a serious menace to Christendom, and the leaders of the church felt it was necessary to encourage the military spirit and enlist it on the side of the Christian faith. One outcome of this

spirit was the series of Eastern wars known as the Crusades, which, though they failed in their direct object, yet brought many indirect benefits to Europe, and in all probability saved it from the attempt of a Mohammedan Seljuk conquest. Every soldier who took part in these conflicts went ostensibly as the servant of the church engaged in a holy war. Then, too, arose the various semi-monastic orders of knighthood, such as the Knights Hospitallers, the Knights Templars, &c., and also the custom which every knight, whether crusader or not, was required to bind himself to serve and defend the church. In the eleventh century, and for a period long afterwards, all gentlemen who had passed through the grades of page and esquire, and had given proofs of their courage and efficiency in military exercises, were eligible for the honour of knighthood. When the full ceremonial was observed the candidate was required to prepare himself by fasting, prayer, bathing, and by a midnight vigil in a church, followed by the reception of the eucharist. He was then conducted into the presence of the prince or great man who conferred the honour, and after being invested with a sword and golden spurs, he was dubbed knight by a blow upon the cheek or shoulder. He then took upon himself the vows of knighthood, binding himself to maintain the right, to protect those who were distressed, and to sustain at all times the honour of his order. The full ceremonial, however, could only be observed in times of peace, and when knights were created before or after a battle the ceremony observed and the words of creation and exhortation were of a very brief character. In all, however, the "accolade," a blow upon the shoulder with the hand or sword, formed an essential part. The honour might be lost by conduct of a disgraceful character, and in such cases a regular process of degradation was followed. The knight was dressed in his armour and provided with his arms, and then his golden spurs were buckled from his heels with a hatchet; his sword-belt was cut and his sword was broken over his head; his escutcheon was reversed, and piece by piece his armour was stripped from his body. His superior then publicly pronounced him no longer "knight" but "knave."

In time of war each knight was supposed to be attended by his esquires, and these in their turn by the yeomen of the knight's estate, all of whom were combatants, so that when we read of an army consisting of a certain number of knights, it must be taken to imply a number of actual soldiers from ten to twenty times as great, or even more than that. According to some historians, in the earliest periods all knights were qualified to confer the honour of knighthood; but this is regarded by others as doubtful, and it is certain that the right was restricted to sovereigns, princes, and persons of high rank during the eleventh and twelfth centuries. Originally a purely military distinction, in the sixteenth century it began to be conferred upon civilians who gained the favour of the sovereign, and since the reign of Charles II. it has been bestowed in England as a mark of honour for valuable services of various kinds.

Knighthood in England is now conferred by the crown by simple verbal declaration, attended with the laying of a sword upon either shoulder, and without any patent or other written instrument. Sometimes, but rarely, and chiefly in the cases of governors of colonies and other persons in high stations abroad, knighthood is conferred upon persons who do not come into the presence of royalty. The lord-lieutenant of Ireland has a delegated authority to confer this honour. Knighthood gives precedence over esquires and other untitled gentlemen. "Sir" is prefixed to the baptismal name of knights as well as of baronets, and their wives have the legal designation of "Dame," which is converted in ordinary speech into "Lady." The dignity of knighthood, however, is not hereditary, but merely personal. Baronets therefore use the contraction "Bart." after their names, to distinguish themselves from

knights. Besides those who are simply knights there are those who are members of particular orders or classes. Simple knighthood is hardly known outside of Great Britain, but numerous orders exist in most of the kingdoms of Europe, and have generally for their founder a sovereign prince. The chief British orders are those of the Garter (K.G.), the Bath (C.B.), the Thistle (K.T.), St. Patrick (K.P.), the Star of India (C.S.I.), St. Michael and St. George (C.M.G.), and the Indian Empire. [See BATH, KNIGHTS OF THE; GARTER, ORDER OF THE, &c.] The Order of the Thistle was founded by James II. in 1687, and after falling into abeyance was revived by Queen Anne in 1703. The number of knights was limited to thirteen, but in 1827 the number was increased to sixteen, all of whom are nobility of Scotland. The Order of St. Patrick was instituted in 1788. The knights were originally limited to fifteen, but the number was increased to twenty-two in 1833. The Order of St. Michael and St. George was founded in 1818 for natives of the Ionian Islands and Malta, and for service in the Mediterranean. In 1868 and 1877 it was extended to any part of the colonial possessions, and in reward for foreign service anywhere. The Order of the Star of India was instituted in 1861, and the Order of the Indian Empire in 1878.

A few words must be added in reference to knighthood regarded as a mode of feudal tenure. When the practice of paying money in lieu of military service extended, knights or "lesser barons" became liable to many oppressive fines and restrictions. Most of these were imposed for the benefit of the superior lord from whom the land was immediately held, but others were imposed for the profit of the sovereign. What had been originally a means of enforcing the performance of a duty to the crown by persons holding a certain property in the country, was perverted into a process for extorting money, even from those who would have been exempt at common law, which regulated the amount of a knight's fee by the sufficiency of the land to support a knight, and not by its fluctuating nominal value in a debased currency. This oppressive proceeding became a very serious grievance under the Tudors and the first two Stuarts. By Charles I. the practice was reduced to a system, and was adopted by him as one of the modes of raising money without resorting to Parliament, and this abuse of the ancient prerogative led to its total abolition. In 1656, during the Protectorate, all tenures in chivalry were converted into free and common socage, and after the Restoration the change was finally completed by the 12 Car. II. c. 21. See also FEUDAL SYSTEM.

KNIGHTON, a market-town of Wales, in the county and 10 miles north-east of Radnor, is situated on the borders of Shropshire, and separated from them by the river Teme. The Welsh name is Tref-y-clawdd, which signifies "the town upon the dyke" (Olla's dyke). It is governed by a bailiff under the queen, who is lady of the manor. It is awkwardly built on the side of a steep hill. The town is a railway station, 25 miles from Builth, and 188 from London. The population in 1881 was 1905.

KNIGHTS HOSPITALERS and KNIGHTS OF ST. JOHN OF JERUSALEM. See HOSPITALIERS; JOHN, KNIGHTS OF ST. OF JERUSALEM.

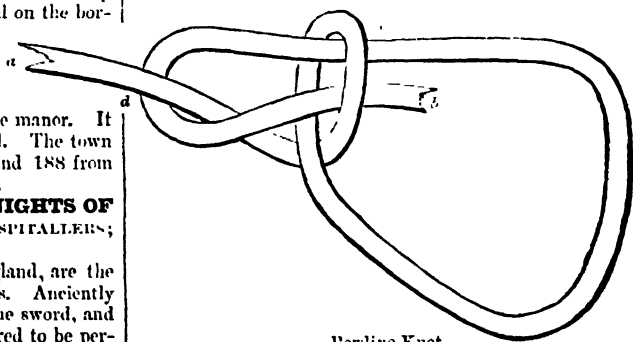
KNIGHTS OF THE SHIRE, in England, are the parliamentary representatives of the counties. Anciently they were required to be knights girt with the sword, and afterwards they and their electors were required to be persons either resident or having a household in the county, but this regulation was repealed by 14 Geo. III. c. 58. A property qualification, requiring the possession of an estate of the clear yearly value of £600, was enforced by the 1 & 2 Vict. c. 48, but this was subsequently entirely abolished by 21 & 22 Vict. c. 26.

KNIGHTS TEMPLARS. See TEMPLARS.

KNOT (*Tringa canutus*) is a bird nearly allied to the DUNLIN (*Tringa alpina*), and belonging to the great snipe family (Scolopacidae). It is about 10 inches in length, with a short bill and legs. It passes through England on its way to its arctic breeding-places in spring, and returns early in the autumn, wintering as far south as Brazil, China, South Africa, and Australia. It breeds very far north, the only known breeding-places being Parry Islands, Melville Peninsula, the northern coast of Grinnell Land, and the shores of Smith Sound, the knowledge of its breeding in the two last-named places being due to the last English expedition to the North Pole. Captain Feilden of the *Alert* procured a pair with their nestlings, which are now deposited in the British Museum, but not a single egg is known to exist in any collection. In the summer its upper plumage is black, with the feathers margined with reddish-brown and white, and the whole lower surface rich reddish-chestnut; in the winter it is ashy-gray above, and white streaked with gray beneath. In this country the knot is met with on the shores chiefly of the southern and eastern counties.

KNOT, a seafaring term for a *nautical mile*, there being 60 knots to a degree (measured at the equator) and 3 to a league. The admiralty knot is 6080 feet, nearly 2027 yards; so that $69\frac{1}{8}$ miles = 60 knots, or as a very rough approximate, 7 miles = 6 knots. When, therefore, a ship is sailing 12 knots an hour she is sailing nearly 14 ordinary miles an hour. The knot is used for ascertaining the speed of a ship's sailing by means of the log-line knots, which are placed at 50 feet 8 inches from each other, so that 120 knots, that is $120 \times 50\frac{1}{2}$ feet, make a geographical mile. The log being thrown into the water and kept as stationary as possible, the log-line bearing the knots is run out for a half minute, or for a given number of half minutes; then as many knots will run from the reel in each half minute as the vessel sails miles in an hour, the proportion in which the line is divided being to a geographical mile as half a minute is to an hour—viz., as 1 is to 120. Note being taken of how many of these knots run out in each half minute, it follows that the vessel is passing through the water at the same number of geographical miles per hour. See also LOG.

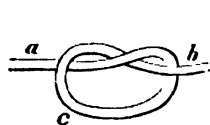
KNOTS, BENDS, and HITCHES are contrivances for the use of ropes, and hence the great authorities upon their use and depositaries of information concerning them are our sailors. The office of the *knot* is to raise a thickening on a rope by twisting the rope or by twisting its strands; that of the *bend* is to fasten two ropes together;



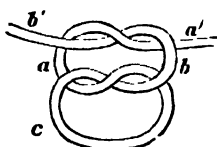
Bowline Knot.

that of the *hitch* is to fasten a rope to a piece of timber, &c. Some bends are used in fastening ropes to anchors, masts, &c., and some hitches are used to fasten two ropes together, but their main functions and their general characters are clearly distinguishable. Above is a representation of a bowline knot, which is perhaps the most generally

useful knot, as it can never slip. In this knot *a* is the standing part, *b* the running part. A loop (or in technical phrase a *bight*) being made on the rope, as at *c*, the running part is brought up through this bight or loop, passed round behind the standing part at *d*, then brought in front of it, crossing over it and through the loop. The famous reef-knot is very useful for tying the two ends of a piece of string together, and as it is no more difficult to make than a "granny," which is a most insecure knot, and yet is by far the most commonly used (by those who know no better), it is well worth while to describe this very simple construction. Of course the name comes, as every one knows, from the office of the reef knot, its use being to tie the reef-points of the sails in reefing. There is a simple knot called an *overhand knot* which we must first understand.

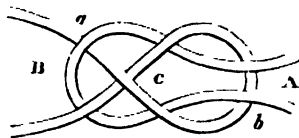


Overhand Knot.



Reef Knot.

Here *a*, as before, is the standing part, *b* the running part. A loop, as the loop *c*, being formed on *a*, the end *b* is passed *over* *a* and through the loop; hence the name overhand. Now taking the ends as they are left above, and bending them round towards one another, carry *b* again *over* *a*, and then under it, and we get the reef knot. Here *a* and *b* are as we left them, and *a* being bent to the right, as at *a'*, *b* is observed to pass *over* it and then through the loop thus made to *b'*. The original loop *c* represents here the part of the string passing round the parcel, &c., we have been tying up. If after making our overhand knot, and bending *a* to the right at *a'*, we had taken *b* *under* instead of *over* *a'*, we should have made the common and insecure "granny." Perhaps it is needless to observe that though no men are more tender to their old people ashore than our sailors, yet a "granny" on shipboard is felt to be emphatically out of place. These knots are to form such a thickening of the rope as to prevent its slipping past the given point. There are therefore a great many very fanciful knots of a closely allied kind, those formed at the end of a rope, so as to keep it from slipping through a ring or an eye, and obtained by untwisting the strands of the rope and weaving them up again into a *diamond knot*, a *shell knot*, a *rose knot*, a *turk's head knot*, a *crown*, &c. Some of these forms are doubled (double crown, double wall, &c.) and become very complicated. It is, of course, as trials of neatness and skill that these finer varie-



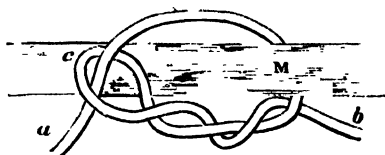
Sheet Bend.

ties are valued by seamen. The knots formed in a line in its course are the *overhand*, *reef*, and *bowline*, already given, the *sheepshank*, the *buoy-rope*, &c. Should it be desired to use the knot in coupling two ropes together (which is, as above explained, the special function of the bend), the two ropes have each a knot run on them, and are drawn together by a small cord (a *lanyard*) attached to the neck of the knot on one rope, and then firmly tied about both ropes.

Bends fasten ropes together as their chief function. A very useful bend is the *sheet bend*; others are the *carrick*,

the *fisherman's*, &c. In the *sheet bend*, as is seen in cut, there are two ropes, *A* and *B*. A loop being thrown on *A*, the running part of *B* is passed through it at the point *a*, round behind it at the point *b*, then through the loop again, but also this time under its own standing part at the point *c*.

Hitches.—The common *timber hitch* is shown in the illustration. The running part *b* is taken round the mast



Timber Hitch.

M, then round the standing part *a* at the point *c*, and then twisted under and over itself several times. Other hitches are the *half hitch*, the *clove hitch*, the *rolling hitch*, the *blackwall hitch*, the *midshipman's hitch*, &c.

KNOUT, an instrument of punishment formerly used in Russia for all classes and degrees of criminals. It consisted of a scourge made of thongs of ass's hide plaited together and interwoven with wire. The blows inflicted by this instrument were of terrible severity, and a sentence of 100 or 120 lashes was generally equivalent to the penalty to death. John Howard also found during his first visit to Russia that it was sometimes used to cause death when only a limited number of lashes had been ordered. In such cases the person inflicting the punishment was privately instructed beforehand, and dealt some blows upon the sides instead of the back of the victim. The punishment of the knout was frequently inflicted as a prelude to banishment to Siberia, and in early times it was accompanied by branding on the forehead and cutting off the ears. The nobility of Russia were legally exempt from the knout, and the punishment was at a later period reserved for murderers, incendiaries, mutinous soldiers, and persons guilty of the more serious offences. It was abolished by the Emperor Nicholas, though the punishment of flogging with a lighter lash, or with birch-rods, was retained.

KNOWLEDGE. Our knowledge of the universe in which we live and of which we form a part, divides itself naturally, and at once, into two great portions. On the one side lies the knowledge of *things*, and on the other the knowledge of *thoughts*; or if we choose we may call them matter and mind, or better still object and subject. A very slight examination reveals a fundamental difference between these two divisions of knowledge, for one of them is without the property of *extension*, a property which extends to every portion of the other. Matter, or the basis of object-experience, has *extension*, size, magnitude—a tree is so high, so thick, so far off, &c.; but mind, or subject-experience, is entirely devoid of this property—a thought, however beautiful, has no thickness, no pleasure can be measured by inches, nor has a voluntary act any weight avoirdupois.

But since matter is only cognizable by means of mind, and since every portion of object-experience reaches us in the form of a subject-experience, knowledge must be studied from a subjective aspect. That is to say, it is useless for us to think we know anything absolutely about an apple as such, or as a thing in itself; what we know is the sensations which that apple excites in us. There is every reason to believe that the green colour of an apple is produced by the appetite for red on the part of the apple, so that in reflecting white light it withholds and absorbs the red elements and lets only the green pass; but it would be the height of absurdity for any one to call a green apple red. We perceive it as a sensation of green, and it must be called green.

Further, this simple sensation may awake a pleasant feeling, and so call into action the will—a desire to eat the apple may come. Then the will may be checked by memory—a remembrance arises that green apples are not wholesome; the judgment comes into play, and the apple is left to lie where it is. Thus arise mental operations due to an original material stimulus: but a little thought will show that in every case it is the mental operations, and not the stimulus which causes them, which we really do *know*. Consequently the study of the nature of knowledge resolves itself into the study of mind: and this divides itself into the three great functions which showed themselves in our illustration above, (1) The feelings, both *SENSATIONS* and *EMOTIONS*; (2) the *WILL*; (3) the *INTELLECT*, containing perception, memory, conception, abstraction, reason, judgment, and imagination, and based on three fundamental properties of the mind—the consciousness of agreement, the consciousness of difference, and retentiveness (memory). Many of these departments of mind are separately treated, and the article *MIND* itself deals with anything not found elsewhere.

The nature of knowledge being thus set forth it naturally occurs as the next question, How do we come by our knowledge? The great mass of it we obviously derive by experience, either of our own or by trust in that of others. The rough undigested material thus gathered is, when systematized and logically arranged, called by the special name of *science* or *philosophy*; but there is no difference between ordinary knowledge and science except only this systematization and careful verification. But as to some small part of our knowledge it is alleged that it is *innate*, that we derive it not by experience but by intuition. The ideas of God and immortality, of right and wrong, of space and time, the notion of cause, are all asserted by some to be independent of experience. Such are usually called innate ideas, and it is claimed for them that they have a more extensive applicability from their *a priori* character than any truths resulting from simple observation, and that they possess two very remarkable properties, *necessity* and *universality*. There are, however, many and probably fatal objections to the setting apart of these or of any other portions of knowledge as distinct from the rest, and in the special article on the subject these will be found set forth. See *IDEAS*.

Since men have learned that

"The pen is mightier than the sword,"

the dignity and power of knowledge need scarcely to be enlarged upon. Neither do the pleasures of knowledge require advocacy to him who has once tasted them, for they are the only pure selfish pleasures we have; no one is harmed by our being wiser, and all may be winners in the same race. Usually, also, great knowledge is only too ready to divest itself of any selfish character, and we find the most learned man of his day, Dr. Samuel Johnson, teaching the beginnings of Latin, from the alphabet onward, to Fanny Burney at Streatham. Usually the more truly learned a man is, the more modest he is of his acquirements and the more ready to share his intellectual treasures with others. Besides the power, the satisfaction, the benevolent impulses of knowledge, it affords a certain gentle excitement to those eager in its search, rising sometimes into passions swaying the whole being. Newton, as he drew near the close of his calculations on gravitation and saw the result arriving at last, had to give over the figures to a friend, the excitement rendering him unable to trace them. Every good teacher works upon this feature of knowledge, arousing the pupil's desire to know something just beyond his present state of knowledge; and when he has attained to that, providing that it shall turn out to be but a height from which further and more tempting heights may be descried beyond.

In the vast mass of human knowledge, what parts should be singled out as necessary at the least for all men to learn is the problem which puzzles the professional educator. Directly we step beyond the obvious essentials of reading, writing, and arithmetic in their simplest aspects, we are met by a crowd of subjects which cannot all be properly studied, even if all a man's life were to go to the attempt, and which, *a fortiori*, it is hopeless to attack in the years of school-life that for the greater part of mankind means their whole term for acquiring knowledge in any completeness. It would certainly seem desirable to gather correct notions of our own bodies, and some few notions of their relations to the bodies of others; the province of *physiology*. Then we should know something of our surroundings if we would not make life a series of blunders; and this is the province of *physics* and of *chemistry*, covering our outward daily life in all its varied aspects. But our inward life should not be ignored; the laws and methods of thought ought, at all events in their widest generalizations, to be familiar to us, and hence *psychology* comes to be a necessary study. Extending our view beyond our immediate selves in place and time, we require to know the nature of the earth and of the universe of which it forms a part, and *physiography* and *astronomy* claim these as their provinces; and the studies of *history* and of *political geography* are indispensable to satisfy our necessity for knowledge of mankind at large, in the present and in the past. In this view, at least one foreign language would also seem necessary to be studied. Thus can we gradually come to feel our place in the world, to recognize the way by which we have arrived at it, and the means by which it may be bettered. Less obligatory would seem the varied studies of *art*—music, painting, poetry, the drama, and literature in general; and yet some, though perhaps not all of these provinces of knowledge must be to some slight extent possessed, to satisfy the emotional and imaginative side of our nature. But in any general view of merely necessary knowledge, such attractive subjects may be safely left very largely to care for themselves. The artist can feed his faculty with a bit of burnt stick on a wall, the musician has the finest of all instruments given him by Him who made his throat, and life itself is a drama to the poet. Woe, woe, unto the poet who sees the budding talent and checks it or fails to encourage it; fearful is the responsibility upon him!

KNOWLES, JAMES SHERIDAN, dramatic author, was born in the city of Cork on the 21st of May, 1784. His father was a man of learning and ability, the nephew of Sheridan the lexicographer, and first cousin of the more distinguished Richard Brinsley Sheridan. The family removed to London in 1792, and here the boy James was educated, forming acquaintance, as he grew up, with Hazlitt, Coleridge, Lamb, Edmund Kean, and Macready. Knowles made his first appearance as an actor at Crow Street Theatre, Dublin, having previously written some minor poems and tragedies. He next joined a company at Waterford, and produced for Kean the tragedy of "Leo the Gipsy," his first acted play. He afterwards lived in Belfast and Glasgow as a teacher of elocution. In 1815 appeared his first successful play of "Cains Græchus," which was followed by "Virginius," produced on the London stage by Macready, and identified with his genius. The drama of "William Tell," appeared in 1825, establishing Knowles' reputation as a dramatist; this was succeeded by "The Beggar's Daughter of Bethnal Green" and "Alfred the Great." Then came another triumph, "The Hunchback," produced at Covent Garden in 1832; quickly followed by "The Wife," in each of which Knowles himself supported the principal character. He brought out the "Love Chase" in 1837, which was played at the Haymarket for more than a hundred nights. At the instance of the Dramatic Authors' Society, a pension of £200 a year was granted to him out of the civil list in 1843. His dramatic works are published

in three volumes. In 1852 he became a Baptist preacher, published some controversial works, and distinguished himself by his religious zeal. He died at Torquay in Devonshire, 1st December, 1862.

KNOX, JOHN, the great Scottish reformer, was born at Haddington, the county town of East Lothian, in 1505. His father William Knox is believed to have been a descendant of an old family, the Knoxes of Ranfurly in Renfrewshire. His mother's name, which he sometimes assumed in troublous times, was Sinclair. He was educated at the grammar-school of Haddington, and in 1522 his father sent him to the University of Glasgow, where Dr. John Mair or Major was professor of philosophy and theology. On Major's removal to St. Andrews, Knox seems to have followed him, but there is very little evidence on this point, and the movements of Knox for several years afterwards are involved in obscurity. He left the university without taking a degree, and he became a secular priest about 1530, and for some ten or twelve years afterwards he seems to have laboured quietly in his vocation in the neighbourhood of his native place. It was a time of ferment and unrest, for the heaven of the Reformation was working in Scotland as well as in the rest of Europe, and Knox, who from the first had been an eager student of theology, was profoundly impressed by the preaching of Thomas Guillaume, a reformed Benedictine, and the saintly George Wishart. About 1543 he openly professed himself a Protestant, and attended Wishart in his preaching in Lothian, bearing a sword for his defence. Knox in consequence of this change was deposed from his ecclesiastical office, and he accepted the protection of the lairds Hugh Douglas of Longniddrie and John Cockburn of Ormiston, to whom he seems to have acted as tutor. In March, 1546, Cardinal Beaton ("see Beaton"), who had procured the arrest of George Wishart, caused him to be burned in front of his windows at St. Andrews; the intense sorrow of Knox, who in his love for his friend desired to share his fate, but was hindered by Wishart to return to his work. In May, 1546, Cardinal Beaton was murdered in the same chamber from which he had witnessed the martyrdom, and his castle at St. Andrews became the stronghold of the reforming party. Here Knox took refuge with his pupils in 1547, and here in the chapel he was publicly called to take up the work of the ministry by the preacher John Rough, and the assembled congregation. Knox burst into tears on receiving this admonition, and ran out of the chapel, but he accepted it as a divine call, and at once commenced to preach with enthusiasm and power. In June, 1547, the Roman Catholic forces of Scotland were strengthened by the arrival of a fleet from France, and the garrison of the castle, invested by sea and land, were forced to capitulate. Honourable terms were granted them, but these were not observed after the surrender, and Knox, with some others, was shut in chains to Rouen, and there condemned to the galleys. The life of a gally slave was hard and painful, and many efforts were made by the ecclesiastics of Rouen to procure the conversion of the Scottish Protestants who were thus situated. They all remained firm, however, and though at one time, owing to the exposure and hardship, Knox was seized with so severe a fever that his life was despaired of, he recovered, and after nineteen months' imprisonment was liberated in February, 1549. He seems to have owed his liberation to the English court, and after being set free he repaired at once to England, where he was favourably received by the leaders of the Reformation. He was appointed preacher in Berwick, where he laboured for two years with such zeal and success that he aroused the active hostility of Tonstall, bishop of Durham, who was a strong adherent of Roman Catholicism. In the contest with the bishop Knox came off victorious, and in consequence he was appointed preacher at Newcastle, and in 1551 made one of Edward VI.'s chaplains. In the latter

capacity he was consulted in the preparation of the formularies of the Church of England, and is believed to have exercised considerable influence in regard to the changes introduced into the order of its public worship. He was offered the living of All-Hallows, but declined it, and when it was afterwards proposed by the Duke of Northumberland to make him a bishop, and the proposition had been favourably regarded by the king and the Privy Council, the proposal fell through owing to the unwillingness of Knox himself. After the death of Edward VI., July, 1553, Knox remained in England until the persecutions under Mary broke out, when he left the kingdom, and arrived at Dieppe, 20th January, 1554. Proceeding through France to Switzerland, where he was favourably received by the leading divines of the Helvetic churches, he stayed for a time at Geneva, and won the friendship of Calvin. Unable to preach in England he had recourse to his pen, and published several letters of warning and admonition to the persecuted Protestants there. In November, 1554, he was elected pastor of a congregation of English exiles at Frankfurt-on-the-Main, but soon after his settlement he became involved in some dissensions respecting the use of the litany, the wearing of the surplice, and the use of King Edward's Service Book, and he was obliged for the sake of peace to leave the city in March, 1555. Towards the close of this year he visited Scotland, preaching privately in Edinburgh, in West Lothian, Ayrshire, and several other places. It is the opinion of Dr. Laing that it was during this visit to Scotland that Knox married Marjory Bowes, the fifth daughter of Richard Bowes of Berwick, to whom he had been betrothed two years before. Dr. McCre, on the other hand, considers the marriage to have taken place in 1553, before Knox left England. In 1556 he received an invitation to become the pastor of a church of English refugees at Geneva. He had found the door of usefulness almost closed in Scotland, and his mild and temperate letter to the queen-regent thrown contemptuously aside; hence he decided to accept the call to Geneva, and proceeded there in July, 1556. Here he remained over two years fulfilling the duties of his charge, and working zealously in the cause of the Reformation. He published several letters and theological pamphlets during this period, and also a work, which afterwards caused him some trouble, in defence of the Salic law, entitled "The First Blast of the Trumpet against the Monstrous Regiment of Women." (*Regiment* here means of course *regimentum*, government.) Meanwhile changes favourable to the Reformation were taking place in Scotland, and it became evident that a resolute struggle was impending. Looking round for champions to defend their cause, the Protestants sent an invitation to Knox, and he resolved to return and take his part in the fray. An application made to the English government for permission to pass through the kingdom was refused, possibly on account of the political pamphlet mentioned above, but Knox soon found a vessel sailing direct to Scotland, and leaving Dieppe, 22nd April, he landed at Leith, 2nd May, 1559. From this date his name becomes inseparably associated with the progress of the Reformation movement in Scotland. During his absence at Geneva he had been tried and condemned in Edinburgh for heresy, and his effigy had been burned at the cross in that city. In consequence of this he was proclaimed an outlaw and a rebel as soon as it was known that he had returned to the country. Knox, however, made his way northwards, and at once joined the leaders of the Protestant party, who had assembled under Erskine of Dun at Dundee. From Dundee he went with them to Perth. Here he preached with such fervour against the use of images in divine worship, and the mass, that the enthusiasm of the multitude was aroused, and in a wild riot all the altars, images, and ornaments of the church were torn down and destroyed,

and the religious houses of the Gray and Black Friars demolished. •

These excesses were ascribed by Knox to the "rascal multitude," but he can hardly have exerted himself to repress them, for similar results attended his preaching at St. Andrews, and in the imitations of these proceedings in other parts of the country many fine edifices were destroyed and many valuable works of art perished. When the army of the Lords of the Congregation reached Edinburgh, Knox preached on the day of their entrance in the Church of St. Giles, and the next day in the Church of the Abbey. The inhabitants immediately met and elected him their minister, but upon the approach of the army of the queen-regent he went with the Lords of the Congregation, and in behalf of the cause made an extensive tour through the country, and preached with much success in many of the larger towns. When, owing to the death of the queen-regent and the assistance given by Elizabeth to the Protestants, a truce was proclaimed, a free Parliament was assembled at Edinburgh in August, 1560, to settle the differences between the contending parties. A petition in favour of Protestantism was at once presented, a Confession of Faith was drawn up, which was accepted by the Parliament, and the papal jurisdiction and all penal laws in its favour having been abolished, the Reformed Kirk was formally established as the national church of Scotland. A Book of Discipline was compiled; pastors, elders, and readers were appointed, and five superintendents were set over the different provinces. Knox desired the patrimony of the church to be allotted to the support of the ministry, the schools, and the poor, a proposal afterwards characterized by the Regent Murray as "a devout imagination," but one which the selfishness of the nobility and gentry rendered impracticable. The first meeting of the General Assembly of the Church of Scotland was held at Edinburgh, 20th December, 1560.

In August, 1561, Queen Mary arrived from France, and her advent was regarded with many forebodings of evil by Knox, on account of her well-known devotion to the Roman Catholic Church. He had several interviews with her, some of which were of a rather stormy character. Knox has been accused of undue harshness, rudeness, and intolerance in his addresses to Queen Mary, but in the opinion of Carlyle his speeches were "about as fine as the circumstances would permit." In 1562 he took part in a public discussion in the house of the provost of Maybole, Ayrshire, with Quintine Kennedy, abbot of Crossraguel, which attracted much attention at the time, and of which an account was afterwards published by Knox. In 1562 a riot took place in the chapel at Holyrood, and Knox wrote to several gentlemen to attend at the trial of the rioters. In consequence of this he was charged before the Privy Council with treason, and the queen exerted herself zealously to have him found guilty. The nobles, however, acquitted him, and as Knox expressed it, "Madam was disappointed of her purpose." Finally he broke with the court party altogether, although it included Murray, Maitland, and others of his former friends. In March, 1564, Knox, who had been three years a widower and was now on the verge of sixty, married Margaret Stewart, a young lady but little more than twenty years old, the daughter of Lord Ochiltree. The union appears to have been a happy one.

The marriage of Queen Mary with Darnley in 1565 was soon followed by a second appearance of Knox before the Privy Council for preaching a sermon reflecting upon the king, and he was ordered to desist from preaching. He seems to have lived in retirement after this for about two years, though he wrote at the request of the Assembly several public letters, and also a large portion of his "History of the Reformation." He also visited England, and carried a letter from the Assembly to the English bishops asking lenity for those ministers who objected to use any sacerdotal vestments.

The murder of Rizzio took place 9th March, 1566, and the murder of Darnley followed 9th February, 1567. Knox maintained, in respect of the latter crime, that the queen ought to have been put upon her trial, and if found guilty to have been put to death. The marriage of Mary to Bothwell, her defeat, imprisonment, and the coronation of the infant James VI. followed in rapid succession, and these events brought Knox once more prominently to the front. On 29th July he preached the coronation sermon in the parish church of Stirling, and in the December of the same year he preached at the opening of Parliament. He had become reconciled to Murray, and gave him valuable assistance in the carrying on of his government. He also laboured earnestly to establish the cause of Protestantism, and to secure a safe position and regular income for the clergy. The assassination of Murray in January, 1570, caused the deepest anguish and anxiety to Knox, who saw in the event a national calamity. The grief caused by this event, and the confusion which followed it, so preyed upon his health, that in October of the same year he had a stroke of apoplexy, and though he recovered his speech after a few days, he never regained his former vigour. As the queen's party gained strength, the position of Knox became perilous. He was subjected to numberless annoyances, and an assassin fired into his house. He left Edinburgh and took up his abode at St. Andrews, still carrying on by tongue, pen, and counsel the great work to which his life had been devoted. His health was feeble, but still he preached. An interesting description of his appearance and manner at this period is preserved to us in the diary of James Melville: "He was very weak. I saw him, every day of his doctrine, to hulk and fear (slowly and cautiously) with a furring of manticks about his neck, a staffe in the one hand, and gude, godlie, Richard Ballenden, his servand, hidden up the uther oxter, from the abbey to the parish kirk, and by the same Richard, and another servand, lifted up to the pulpit, whar he behouit to lean at his first entrie; bot, or he had done with his sermone, he was sa active and vigorous, that he was lyk to ding the pulpit in blads and the out of it." In August, 1572, he returned to Edinburgh, and on the arrival of the news of the massacre of St. Bartholomew he was assisted into the pulpit, where he denounced, in the most vehement manner, "that cruel murder and false traitor, the King of France," and prophesied that the judgment of God would overtake him. His last public appearance was in connection with the induction of Lawson, sub-priest of King's College, Aberdeen, on 9th November, 1572, after which he returned home to die. An interesting account of his closing hours has been preserved, from which it appears he retained his strength of mind and cheerfulness to the last. He made the arrangements for his own interment, engaged the society of his friends, delivered a farewell charge to his session, which assembled in his chamber, and on Monday, 24th November, 1572, he died in the sixty-sixth year of his age. His funeral, which took place the following Wednesday, was attended by an immense concourse of people, and when the body was laid in the grave, the Earl of Morton, who had been newly appointed to the regency, pronounced the well-known eulogy:—"He livit with a man who in his life never feared the face of man; who hath been often threatened with dagge and dagger, but yet hath ended his days in peace and honour."

Knox left two sons by his first wife, both of whom died young, and three daughters by his second wife. In person he was rather small in stature and wore a long beard, which reached almost to his girdle. In his home life he was affectionate and kind, and among his friends he was a genial and pleasant companion. In respect of his public career there can be no question that he was the moving spirit of the Reformation in Scotland, and that the form it assumed was largely owing to his influence. It was his lot to live in an age of violence and change, and his bold, strong spirit

rose equal to every crisis, and his resolution and persistence never failed. A man of strong convictions he was intolerant of all neutrality or indifference, and in his denunciations he spared neither queen, court, prelate, nor noble, nor did he stay to wait for the most fitting opportunity. It is difficult in modern times, when we are accustomed to freedom of speech and regard it as a matter of course, to estimate the influence which must have been exerted by the boldness and independence of such a man; but when we remember that it was based upon, and found its response in, the conviction of the realities of religion, we must recognize that it was fraught with incalculable benefit to Scotland and to the world. Much has been said concerning the narrowness, egotism, and arrogance of the reformer, and there are doubtless many things in his career which it is difficult to defend; but his sincerity, consistency, and disinterested zeal are beyond question. His secretary Bannatyne wrote in his diary when Knox died, that he was "the light of Scotland, the comfort of the kirk within the same, the mirror of godliness, and patron and example to all the true ministers in purity of life, soundness of doctrine, and boldness in reproving wickedness." Carlyle in his "Hero-worship" says, "He resembles, more than any of the moderns, an old Hebrew prophet. The same inflexibility, intolerance, rigid narrow-looking adherence to God's truth, stern rebuke in the name of God to all that forsake truth, an old Hebrew prophet in the guise of an Edinburgh minister of the sixteenth century. We are to take him for that, not require him to be other."

(See McCrie's "Life of John Knox," first edition, 1811, seventh edition, 1855; "The Works of John Knox," edited by David Laing, six vols., Edinburgh, 1816-64; Burton's "History of Scotland," and Moncreiff's "Influence of Knox and the Scottish Reformation on England," London, 1860.)

KNUTSFORD, a town of England, in the county and 24 miles E.N.E. of Chester, and 12 miles W.N.W. from Macclesfield, and 219 N.W. of London on the London and North-western Railway. The name is said to be derived from Knute (Knut) the Dane, who passed with his army over the small branch of the Bollin, which runs near it. The town is divided into Higher Knutsford and Lower Knutsford by a branch of the river Bollin, which rises about half a mile to the south, and, passing the turnpike road, falls into Tatton Mere. There is a spacious county prison, town-hall, and bank. There are a parish church of the last century, the district church of St. Cross, renovated in 1863, and a very pretty church consecrated in 1866, and a Wesleyan Methodist chapel, built in 1865. There is a literary institute, library, and horticultural society, and a college on the scale of Eton and Harrow, opened in 1874-75. The town also contains a well-endowed grammar and other schools. Cotton, velvet, thread, worsted, and leather are the principal manufactures; but the supplying of the wants of the gentry in the neighbourhood is the chief support of the trades-people. The population of the parish in 1881 was 4859.

KOA LA (*Phascogaleoleucurus*) is a marsupial animal belonging to the family Phalangistidae, or Phalangurs. The koala is an inhabitant of the south-eastern parts of Australia. The body resembles that of a bear in miniature, from which circumstance this marsupial has received the name of Native Bear from the colonists. The body is stout and compact, covered with a dense ashy-gray fur, and measuring about 2 feet in length. The limbs are short, and the tail quite rudimentary. The head is small; the ears moderate, hidden by tufts of long hair. The koala is eminently arboreal in its habits. It lives generally amid the loftiest boughs of the Eucalypti or gum-trees, feeding on the buds and tender shoots. It occasionally descends at night in search of roots; its movements on the ground are sluggish. The female carries her young on her back for a considerable period. The koala is very fearless.

The koala is the only species of the genus *Phascogalea*, which forms a distinct subfamily, *Phascogaleinae*, of the family Phalangistidae. The dental formula is as follows:—

$$\begin{array}{cccc} I. & 3-3 & ; & c. & 1-1 & ; & pm. & 1-1 & ; & m. & 4-4 & = & 30. \\ & 1-1 & ; & c. & 0-0 & ; & pm. & 1-1 & ; & m. & 4-4 & \end{array}$$

The canines are very small; the molars have square crowns bearing four pyramidal cusps. All the feet have five toes. In the fore feet the pollex (thumb) and index digit are opposable to the three outer digits, so as to afford a strongly prehensile action; all the digits have strong curved claws. In the hind feet the hallux (great toe) is stout, nailless, and opposable to the rest; the second and third toes are slender, and united as far as the nails in a common skin. There are eleven pairs of ribs. The stomach has a special gland. The cæcum is very long. There are distinct cheek-pouches.

KOB'OLDS. See GORTLINS.

KOD'ROS. See COBRUS.

KOH-I-NOOR ("mountain of light"), the name of the large diamond obtained by Queen Victoria from Maharajah Duleep Singh, the ruler of the Punjab, on the annexation of that country to British India in 1849. It is said to have originally weighed 900 carats, but being badly cut it was reduced to 279 carats. It was still further reduced, by recutting, to 186 carats, and was thus shown in the Great Exhibition of 1851. In 1852 it was once more recut, and now weighs about 123 carats. Its present value is estimated at £120,664. The last process of recutting was performed by M. Coster, of Amsterdam, in the employ of Messrs. Garrard, and occupied several weeks, on account of the extreme precautions necessary in dealing with a gem of such enormous value. See LAPIDARY WORK.

KOL'CHIS. See COLCHIS.

KOM ORN or **COMORN**, a royal free town of Hungary, on the left bank of the Danube, 48 miles N.N.W. of Buda. It is a steam-packet station, and has an active trade in corn, wine, wood, and fish. The celebrated wine called Monostor grows in its neighbourhood. The town is fortified, and its citadel, constructed by Corvinus, and extended in 1805, is considered one of the strongest in Europe. It was long unsuccessfully besieged by the Austrians in 1819, and only surrendered on honourable terms when the struggle had ceased elsewhere. In the town the inhabitants, who are mostly Protestants, number altogether 11,000. It stands at the mouth of the Waag.

KONG MOUNTAINS. Between 9° and 10° N. lat., and 9° and 10° W. lon., there exists a high mountain knot, in which the Joliba, Quorra or Niger, the Gambia, the Rokell, and the upper feeders of the Senegal take their rise. From this same plateau one mountain range runs north-east, forming the watershed between the basins of the Niger and the Senegal; another takes a north-western direction, dividing the feeders of the Senegal from those of the Gambia; while a third range runs nearly east along the parallel of 9° N. lat., to the northward of the territories of the Mandingoes, the Foola, and the Ashantees. To this last range the name of the Kong Mountains has been given, from the word *kong*, which in the dialect of the Mandingoes is said by Park to mean a mountain. In the kingdom of Yarriba the range is said to turn south-east, and to terminate on the banks of the Niger, near the confluence of the Tchadda with that river. But of this range, if it forms one continuous mass, very little is known. Nothing definite has been ascertained regarding its length, width, or height, though it is said many of its peaks reach the snow line.

KONIGGRATZ, a village in Bohemia, near which was fought the famous battle of Sadowa, between the Prussians and Austrians, 3rd July, 1866. See SADOWA.

KONIGSBERG, one of the two governments into which the province of East Prussia is divided, extends along the

Baltic from the Gulf of Dantzic to the frontiers of Russia, and is bounded south by the government of Gumbinnen and by Polish Prussia. The coast is low and indented by two shallow fresh-water bays, which communicate with the Baltic each by a narrow strait towards its eastern extremity. One of these is called the Kurische-Haff. The other, called the Frische-Haff, extends for 57 miles in a south-west direction from Königsberg, with an average breadth of 5 miles. The Gatt, or strait, by which it joins the Gulf of Dantzic at Pillau, has 12 feet depth of water, and is in breadth 3000 feet. In all the rest of its length it is separated from the Baltic by the Frische-Nehrung, a narrow tongue of land, consisting chiefly of sandbanks. The water in the Haff is shallow, in no place more than 12 feet, especially in summer, so that no large vessels can navigate it. Several arms of the Vistula, the Passarge, which is navigable, and many other rivers fall into the Frische-Haff. The surface of the government is flat and suitable for agriculture, with some extensive forests. Wheat, rye, flax, hemp, &c., are the chief products. Cattle and sheep are numerous.

KÖNIGSBERG, the capital of the above government, is situated near the mouth of the Pregel, 78 miles east by north from Dantzic, and had in 1881 a population of 157,000. It is a fortress of the first class, and consists of three parts, called the Old Town, Löbenicht, and the Kneiphof, besides the royal palace and the citadel Friedrichsberg, and fourteen suburbs. The Old Town and Löbenicht are on the north side of the river; the Kneiphof stands on an island formed by the Pregel. The origin of the city dates from 1255, when the Teutonic knights built a fortress on the height where the castle now stands. After 1365 it became one of the principal cities of the Hanseatic League; and here, in 1701, Frederick III. of Brandenburg was crowned the first king of Prussia.

The town is irregularly built, and the streets are generally narrow and crooked; but during the last few years some better edifices have been erected. The Pregel is crossed by seven bridges. The most remarkable buildings are the castle or royal palace, and the cathedral, in the library attached to which are several autograph letters of Luther to Catherine Bora. Among the numerous public institutions is the university, founded in 1544, with which are combined two theological summaries, one Polish and one Lithuanian, a library of 220,000 volumes, a botanic garden, and an observatory. There are likewise an exchange, town-house, citadel, and theatre, three gymnasiums, school of arts and architecture, deaf-mute and blind asylums, and many other charitable institutions. Königsberg has communication by the Friedrichsgraben Canal with the Memel, by which river, the Oginski Canal, and the Dnieper, it has the advantage of a complete interior navigation into Poland and Lithuania. The town is favoured, by its geographical position, towards the west by a fine harbour almost always free from ice, with which it is connected by water in summer, and by rail at all times. The harbour works at Pillau have been greatly enlarged and improved in recent years, and offer great facilities for trade. To the east, north, and south, Königsberg is connected by railway with St. Petersburg, Moscow, Smolensk, Kieff, Kharkoff, Odessa, the Black Sea, and the interior of Russia. It is also on the main line from St. Petersburg to Berlin. The port of Königsberg is PILLAU, where vessels from Königsberg complete their freight, and there is a line of railway between the two towns. The depth of water in the intervening river has been considerably increased by dredging. The manufactures of Königsberg consist of woollen cloth, linen, cotton, silk, leather, tobacco, sugar, soap, starch, sealing-wax, beer, and spirits. The exports are composed of corn, flax-seed, flax, hemp, oil cakes, feathers, rags, hair, wood, zinc, iron, and hides. The export trade in grain is very extensive, and there are some

shipbuilding yards. The imports are chiefly sugar, coffee, spices, dyewoods, tobacco, salt, various raw materials, and manufactured goods. One-half of the sea-trade is with Great Britain. The Prussian government has built strong forts to protect the harbour, and executed works of great magnitude for the greater convenience and safety of vessels. Königsberg is celebrated as the scene of the labours of the philosopher Kant (1724-1804).

KONX OMPAX, famous words of which the meaning is not now known. They were the very ancient form of dismissal at the close of the Eleusinian mysteries of the ancient Greeks, corresponding to the sacred "Iti missa est" of the Mass. It has been conjectured that the words are of Sanskrit origin. Certainly the later Greeks did not know their meaning, for they say as much, although they uttered them or heard them with great reverence and awe; the elder writers simply report them as holy words. *Konx* would seem likely to be the Sanskrit *kancha*, an object of desire. *Omp* is probably *amen*, and *pax* is *pacsha* (all ended). The whole phrase is therefore, "You have your desires, so be it, all is ended."

KOO'DOO (*Strepsiceros kudu*) is an exceedingly beautiful African antelope. It is most abundant in Southern Africa, but extends as far north as Abyssinia. This magnificent animal is the largest of the antelopes. It stands about 5 feet in height at the shoulder, and measures upwards of 8 feet in length. The horns are massive and beautifully curved into two wide-spreading open spirals, surrounded by a prominent ridge which follows all their windings; they are about 4 feet long, brown in colour, and have their tips directed outwards and upwards. The females are hornless. The muzzle is broad, the ears large and pointed at the ends, and the shoulders much elevated. It is of a brownish-gray colour, and its sides are marked by from seven to ten white stripes. The belly is a pale silvery brown. On the neck and withers is a thin spare mane of a brown colour, and the chin, throat, and breast are furnished with similar long hairs, forming a kind of beard. The tail is reddish-brown, of moderate length, and hairy. The koodoos are gregarious. They live in woods, generally frequenting the borders of streams, to which they readily take when pursued. Their agility is remarkable. When taken young the koodoo is easily domesticated. The flesh of the koodoo is much valued by the natives.

KOOR'IA MOOR'IA or CURIA MURIA

ISLANDS, a group of six islands distant about 20 miles from the south-eastern coast of Arabia, in lat. 17° 33' N. lon. 56° 6' E. They were ceded to Great Britain in 1854. Hellaneeyah, the largest, is inhabited by a few fishermen; the others are very desolate and sterile.

KOPEK, a Russian copper coin, worth about three-eighths of a penny, or more exactly 38 of a penny. It is the one-hundredth of a ruble.

KORAN' or QURAN' (Arab. *Koran*, to read or to collect, hence the reading or thing to be read, or the collection of writings), the name given by Mohammedans to their sacred book, containing the entire collection of the revelations of the Prophet, and also to any portion of them, the term being used much in the same way as that of Scriptures among Christians. By Mohammedans it is also termed *Al Furkan*, the discrimination; *Al Dhikr*, the admonition; *Al Moshaf*, the volume; and *Al Kitab*, the book, a term which corresponds to our own Bible. In old English writers it is often referred to as the *Alkoran*, but the prefix *Al* is only the Arabic for *the*.

With respect to its origin orthodox Mohammedans believe it is an extract from a vast table which stands by the throne of God, and on which are inscribed his eternal decrees. As these decrees form an essential part of the divine nature, they are also eternal and uncreated. They also believe that in the various ages of the world God had been pleased to

reveal his will to men through the medium of many inspired prophets, the last of whom previous to Mohammed were Moses, David, and Jesus. By these the word of God was committed to writing, but all the books of the prophets before Moses were utterly lost, and though the Pentateuch, the Psalms, and the Gospels professed to give the revelations of Moses, David, and Jesus, the books had been so altered and corrupted by Jews and Christians as to have become altogether useless and misleading. The world being thus left without any sure guidance, it pleased God to give another and a final revelation through Mohammed, and the Korân, written in one volume, bound in green silk, and ornamented with heavenly gold and gems, was sent down in charge of the angel Gabriel to the lowest heaven, where Mohammed was permitted to see it. He was not permitted to take a copy of it, but in a variety of ways portions of it were revealed to him from time to time, as the necessities of the new religion required them. Sometimes the word came in a dream or vision of the night, or in a trance or ecstasy in the daytime. Sometimes it was by the spoken words of the angel Gabriel, and at other times the message came through the meditations of the Prophet. Most of these revelations were short in extent, and a single chapter often includes a large number of them; but the whole was given during the mission of Mohammed, no later revelations being incorporated in the sacred book. It is being the seal of all former revelations and the last, the divine power is pledged for its preservation; hence it will remain for the instruction of men, unaltered and uncorrupted, until just before the final judgment, one of the signs of which will be the sweeping away by a hurricane wind of all copies of the Korân from the earth. Like the Jews with their Talmud, the Mohammedans prize a collection of traditions and stories preserved independently of the written law, termed the *Hadise*; and like Christians they recognize as authoritative the unanimous consent of the fathers of their church, termed by them the *Ima*, as also any doctrine that can be deduced by sound reasoning from these sources, the *Quias*, corresponding somewhat to our own systematic theology, but the Korân is pre-eminently the authority in all matters of religion, ethics, social life, and human learning.

From the records of the life of Mohammed [see MOHAMMADANISM] we find that the first revelation was given to him, according to his own account, by a speaking voice during a period of retirement spent in a cave in Mount Hira near Mecca, the message he received on this occasion forming the commencement of the ninety-sixth Sura. He was himself unable to write, but from time to time he reported the words of his revelations to his followers, and caused the greater portion to be taken down by a scribe in writing. The materials employed were such as first came to hand—dried strips of the leaves of the date-palm, tablets of white stone, strips of parchment, dried skins, and shoulder-blades of mutton; and as these accumulated they were thrown undated into a box, without any attempt at order or arrangement, and were so left at the death of the Prophet. A year afterwards his successor Abu Bekr, finding that some of the most famous reciters of the Korân had been lost in battle, commanded one of his secretaries, Zaid ibn Thabit ² Meccan, to collect all that could be found written, and that it was preserved in the memories of those who had listened to the words of Mohammed, and to make a complete and faithful copy of the whole. From this work, which was entrusted to the keeping of Hafsa, one of the widows of the Prophet, copies were multiplied for the use of the faithful, until in the thirtieth year of the Hegira the Caliph Uthman, finding that many of them were imperfect, ordered a large number of exact copies to be transcribed, and caused all the rest in use to be burned. In this redaction an effort was made to get rid of the various readings in use, and to fill up some of the gaps that had been left, and though there have been since then what may be termed the

issue of several special editions, there is no doubt that the Korân remains almost exactly the same as it was left at this time. The utmost care has been taken in transcribing it, and though various readings exist they are few in number when compared with those known to exist in the MSS. of the Hebrew and Christian Scriptures.

In its present form it consists of 114 chapters or *Suras*, the word *Sura* (plural *Soucar*) signifying row or order, as a rank of soldiers or row of bricks in a building. The first Sura is entitled *Al Fatihat*, the preface or introduction, and is a short prayer. It is so beautiful that it should be quoted here, though he would be much misled who fancied the whole Korân continued at this lofty level.

"Praise be to God, Lord of all worlds, most merciful, the King of Judgment. We worship thee, we implore thy help. Guide thou our steps in the right way, even in the way of them thou hast loved; and let us not follow them against whom thou art angry, neither them who go astray."

This touchingly simple petition stands to the Mohammedans as our own Lord's Prayer does to ourselves, and is as frequently in their mouths. It is held in the greatest veneration, and has a host of epithets; it is the *prayer*, the *praise*, the *treasure*, &c.

The remainder of the Suras are arranged somewhat in accordance with their length, the longest being first. They are not numbered, but each one has a distinctive title, generally taken from some person or subject referred to in it; such as, the cow, women, thunder, the bee, smoke, he frowned, the slanderer, &c. Every Sura except the ninth begins with the words, "In the name of God, the merciful, the compassionate." Twenty-nine of them are headed with one or more letters of the alphabet, which are supposed to conceal profound mysteries, and which being interpreted by certain kabbalistic methods give a variety of meanings according to the ingenuity of the expositors. Other and minor divisions into sections and verses are also adopted. The Korân is also divided, regardless of Suras, in more than one way, the principal being a division into thirty equal parts for the convenience of the readers who are employed in some mosques to read through the whole Korân daily, each reader getting through his thirtieth. The number of words in the Korân is 77,639, and the number of letters 323,015. In connection with this it may be mentioned that the Old Testament contains 592,439 words and 2,782,100 letters, and the New 181,253 words and 838,380 letters.

With respect to the language of the Korân it is of wonderful elegance and purity, and it forms the standard of Arabian literature. The Mohammedans declare that no merely human pen could ever write in language so beautiful, and pointing to the fact that Mohammed was an unlearned man, they believe that the composition is so evidently miraculous as to be of itself a sufficient proof of his divine mission. It is written in prose, but it is a rhythmical prose, and there is generally a long-continued rhyme at the end of the sentences. This method of writing was not invented by Mohammed, but he greatly improved the methods in use at his time. Some striking and apparently true stories are told of the way in which portions of the Korân gained the admiration of competent judges among the Arabs, even before the Prophet had made much progress in his mission. The judgment of European scholars, accustomed to a much wider extent of literature than the contemporaries of Mohammed, is less favourable, and most of the beauties of the original are lost in translation. Some very excellent versions into English have been prepared by British scholars, but though these reveal the existence of many passages of striking truth, force, and beauty, the book as a whole is very hard reading. Carlyle speaks of it as "a wearisome confused jumble, crude, incondite; endless iterations, long-windedness, entanglement;" and further, that "nothing but a sense of duty could carry any European through the Korân."

Concerning the subject matter of the Koran, it includes within itself instruction in theology, directions as to the performance of religious and moral duties, a large number of national and social laws, and a system of eschatology, embracing the doctrine of the immortality of the soul, of a final resurrection and general judgment, of paradise and of hell.

The fundamental doctrine in the theology of the Koran is that of the unity of God. In opposition to the idolatrous customs and practices of the Arabians themselves, the idolatry or fire-worship of other nations, and the doctrine of the trinity among Christians, the Koran insists upon the essential unity of the Deity. It was the aim of Mohammed to unite the world in one religion, that would take the place of Judaism, Christianity, and heathenism, the three forms of religion with which he was acquainted; and it was upon the basis of a belief in one God, eternal, invisible, and almighty, that he proposed to found his own system. The conception of God in the Koran, however, differs in many important respects from the conception of the best of the Hebrew teachers, and it lacks also many of the attributes revealed in Christianity. The Mohammedan doctors have reckoned up ninety nine holy names of God in the Koran, but among them all there is not one which corresponds to the "Our Father" of Christ, and the thoughts and emotions called into being by this name have little or no place in the teachings of the Koran. The thoughts which among the ancient Greeks led to the conception of an all-powerful, all-embracing fate, which in the days of the fathers led to the predestination of Augustine, which in the time of the Reformation found expression in the system of Calvinism, and which are otherwise known as doctrines of necessity, are in the Koran based upon the divine nature, and all things are foredetermined and happen by the direct will of God.

The chief religious duties enforced by it are prayer, almsgiving, fasting, the practice of bodily washing or purification, and the pilgrimage to Mecca, which is expressly and repeatedly commanded. It contains many injunctions also as to the observance of moral duties.

The laws contained in the Koran seem to have been promulgated from time to time as the followers of the Prophet required his decision. They regulate the punishments for the more heinous crimes, such as murder, theft, adultery, &c., and deal also with many minor offences. Idolatry is strongly condemned; bribery, gambling, and slander are expressly forbidden, and the necessity for honesty and general uprightness is insisted on with many repetitions. Like the Hebrew Scriptures the Koran contains regulations as to food, and it forbids the use of blood, the flesh of swine, or that of animals which have died of themselves. The use of wine is forbidden, the Prophet declaring in the second Sura that although it has some things useful to man the harm it does is greater than the good; while in the fifth Sura he speaks of it as an abomination of the work of Satan. The civil laws of the Koran relate to the division of property by means of wills, and regulate its distribution where no will has been made, the rights of widows and orphans being protected. True believers are warned against the sin of covetousness, and usury is forbidden.

The most serious defects of the legal portion of the Koran in the eyes of Christians are those which regulate the union of the sexes, which define the relations between Mohammedans and those of other religions, and the support it gives to slavery. It must be remembered, however, that Mohammed found polygamy prevailing without limitation when he commenced his mission, with the practice of almost unrestrained power of divorce upon the part of the husband, and that the influence of the Koran was in the direction of restraint and regulation in both respects. Slavery, too, was also almost universally prevalent at that time; and it is well to remember that even among the few-

most Christian nations this iniquity was defended and retained until within a very recent period. The duty of making war upon unbelievers is repeated in many passages of the Koran, and to this must be ascribed much of the early success of Mohammedanism. The reward of paradise is again and again assured to all who fall in battle against the unbeliever, and that the message has not lost all its old power the events which occurred in the Sudan in 1883-85 bear witness. This element in the Koran still inspires a fanatical feeling of hatred and contempt against those of other religions, and so long as the injunctions of the forty-seventh Sura, "When ye encounter the unbeliever, of the Koran strike off their heads, until ye have made a great slaughter among them, and bind them in bonds," or that of the forty-eighth Sura, "Ye shall be called forth against a mighty and a warlike nation; ye shall fight against them or they shall profess Islam," with many similar passages, are accepted as divinely inspired commands, so long will there exist the danger of outbreaks of fanatical zeal and of horrible massacres.

The leading ideas included in Mohammedan eschatology have already been referred to. The descriptions of paradise given in the Koran are evidently intentionally directed to excite the fanatical zeal of the followers of the Prophet. Repose, shade, luxury, and the unlimited indulgence of the bodily appetites are all held out as the rewards of the faithful; while on the other hand the torments of the damned are described in a manner which reminds us of the mediæval monkish writings on the same subject. Fire, smoke, boiling water, fumes, corruption, and the malicious torturing of evil spirits are all depicted in the most atrocious manner, and the misery caused is described as lasting for ever. By orthodox Mohammedans a doctrine of purgatory has been formulated, and it obtains general acceptance so far as it affects all true believers, but the doctrine is not directly taught in the Koran.

In conclusion, it may be observed that no book ever written has been received with more veneration and respect than the Koran. In some of the mosques, as we have observed, it is read through every day, and some of the Mohammedan doctors are said to have gone through it in their studies 70,000 times. The sentences are carefully preserved, and have been written upon it, and it is said that the library at Tripoli at one time alone included 20,000. Its sentences are inscribed as ornaments upon the walls of palaces, are placed upon the banners of the army, upon weapons of war, sword rings, and wherever they can be placed with honour. Costly volumes are prepared for the wealthy, and these are ornamented with covers embellished with gold and jewels. No pious Mohammedan would hold a copy lower than his waist, or touch one with unclean hands. An injunction warning all who are such as not to touch it is generally written upon the cover, and that respect for it makes Mohammedans unwilling to see a copy in the hands of an unbeliever. That this extreme veneration is a serious barrier in the path of progress must be self-evident. The evils of polygamy and slavery are now clearly perceived by Christian nations, but it is impossible to convince Mohammedans of them while they regard as sacred and indubitable the Koran, which sanctions both. Nor can the exclusive claims of Mohammedanism be given up in the face of the positive teaching of the same book upon the subject. At the same time it would be unreasonable to overlook the fact, that in its teaching concerning the unity, spirituality, eternity, and providence of God, its inculcation of the necessity of obedience to duty, of kindness, and of charity, and in its pointing to a future life and final judgment, it exercises an immense influence for good upon the lives of millions of men. Much true piety, both in the past and present, has found support from the teachings of the Koran.

The Koran has been translated into most European and

Oriental languages, and numerous critical editions with comments and notes have been published. Of English editions the best known is that of Sale (first edition, 1734), which is constantly reprinted; a later translation, having the merits of a finer English style as well as a closer adherence to the original, was published in 1880. Its author was Professor E. H. Palmer, whose friendship with Arabs and univalued knowledge of Eastern tongues, together with an adventurous and courageous disposition, led the English government to make use of him in the Egyptian campaign of 1883, hoping by his means to win over the sheikhs. Unhappily the endeavour cost Palmer his life. It forms volumes vi. and ix. of the "Sacred Books of the East," issued at Oxford under the editorship of Professor Max Müller.

KORDOFAN or **KORDUFAN**, a country lying to the south of Nubia, in Central Africa, formerly a dependency of Senaar, since 1820 a province of Egypt, between lat. 12° 21' and 15° 18' N., lon. 24° 31' to 27° 37' E. The Bahr-el-Abiad (White Nile) traverses the south-eastern part of the country, which consists of an assemblage of several small oases, divided from Darfur by vast deserts. The population is composed chiefly of negroes, who devote themselves to agriculture. The rest of the inhabitants are settlers from Dongola, who are merchants and frequent the caravan routes, and Arabs, who in general wander from place to place in the deserts. Gold dust and iron ore are found; the latter is worked. On the oases the principal objects of cultivation are millet, sesamum, and some wheat and barley. The soil is peculiarly adapted to the cultivation of the first article, which is the staple food of the country. The wealth of the Arab tribes consists of their horses, cattle, and camels, which latter are lent on hire. The negroes rear a number of cattle, sheep, and goats. Among the wild animals are elephants, giraffes, and antelopes. This district was first made known in Europe by Bruce. Slavery was abolished in 1857.

Obel or *El Obaid*, the chief town, consists of several villages of mud houses, covered with straw, clustered together in an oasis. It was in his attempt to rescue the Egyptian garrison at El Obaid that Hicks Pasha and his army were completely annihilated by the forces of the Mahdi in 1883. (See **SUDAN**).

KORNER, THEODOR, a celebrated German patriot and poet, was born at Dresden, 23rd September, 1791, of respectable parents. The weakness of his health prevented any great application to study; but as he grew, both his mind and body gained strength, and he showed an early inclination to history, mathematics, and physical science. He went to the universities of Leipzig, Berlin, and Vienna, where he laboured much at poetical composition. Two plays, "*Die Braut*" (The Bride) and "*Der Grüne Domino*" (The Green Domino), were acted at Vienna in 1812, and meeting with success were followed by others, of which "*Zriny*" and "*Rosamunde*" (the English Fair Rosamond), two tragedies, were works aiming at a high character.

The events of the year 1813 made a deep impression on Körner. Inspired by patriotic zeal he joined a volunteer corps in the cause of Prussia against the French. He was wounded by two sabre cuts at the battle of Kitzeld, and in a subsequent battle, 28th August, he was killed by a shot, and buried by his comrades at the foot of an oak on the hill from Lubelow to Dreikrug.

As Körner was scarcely twenty-two years of age at the time of his death, his works, which are rather numerous, must be judged with lenity. His fame chiefly rests on a collection of lyrical pieces called "*Leier und Schwert*" (Lyre and Sword), many of which were written in the camp. His happiest effort of imagination is the "*Schwert Lied*" (Sword Song), in which the sword becomes a person and addresses its owner—a piece which has been translated (not very closely) by Lord F. L. Gower.

Numerous editions have been published of his works, the first being that of Streckfuss (one vol. Berlin, 1834). This has been several times re-issued, and the edition published in 1879 included a brief memoir of his life, selections from his letters, and some English translations of his poems. A life of the poet, written by his father, has been translated into English, and published with selections from his poems, &c., by G. F. Richardson (two vols. London, 1827).

KOSCIUSKO, THADDEUS, an illustrious Polish patriot, was born in 1746 of an ancient and noble, but not wealthy family of Lithuania. He went to America with Lafayette, and served under Washington in the War of Independence. In 1786 he returned to Poland, and in 1789 was appointed major-general in the army. In the war with Russia in 1791–92 he served with distinction under Poniatowski, but on the submission of King Stanislaus he resigned his position in the army and retired to Germany. In April, 1794, the Polish insurrection broke out, and Kosciuszko, returning, was placed at the head of the national forces with the title of general and the powers of dictator. He at once marched against the Russian forces, attacked them though his own army was greatly inferior in numbers, and gained the victory of Racławice. By a series of skilful movements, and a stubborn defence of Warsaw, he contrived to keep the united Russian and Prussian armies at bay for some months, but in the end their enormous numbers prevailed, and on 10th October, 1794, he was completely defeated at Maesiewicz. Fighting desperately, he was severely wounded and taken a prisoner by the Russians. Within a month from his fall Poland was completely subdued. He remained in confinement at St. Petersburg until the death of Catharine II., when the Emperor Paul I. restored him to liberty and conferred upon him an estate. In 1797 he visited the United States and received a grant from Congress for his services; and returning to France he took up his residence at Fontainebleau, devoting himself to agricultural pursuits. In 1816 he retired to Switzerland, intending to spend there the evening of his days, but an accidental fall from his horse caused his death 17th October, 1817. His remains were removed to Cracow by order of Alexander, and were placed in the vaults where lie the bodies of the kings of Poland.

An able soldier, and an upright, zealous, and unselfish patriot, his name will ever be remembered with honour by his countrymen. His biography has been written by Falkenstein (Leipzig, 1827; second edition, 1834), Chodzko (Paris, 1837), and Paszkowski (1872). (See also "*La Pologne Martyr*," by Jules Michelet, Paris, 1863.)

KOSSUTH, LOUIS, the leader of the Hungarian revolution in 1848, was born on the 27th April, 1806, at Monok, in the district of Zemplin. His father was of noble birth, but not affluent, and acted as procurator-fiscal to Baron Vecsey. The baron took charge of the education of the young Louis and sent him to college, where he showed more than the usual impetuosity of character. He resolved to follow the profession of his father, and after a short private engagement went to Pesth in the year 1831. Here he became representative of a magnate in the diet at Pressburg, and was so far launched on public life; but his first essay, like that of some other eminent men, was not successful. Not disheartened, he turned to the press as the exponent of national opinion, and commenced a lithographed journal, which gave an account of the proceedings of the diet. This journal was soon prohibited by the authorities, but means were found to circulate information, and to establish a system of correspondence that grew into national importance. Again the authorities interfered, and Kossuth in reply stated that there was no censorship in Hungary, and sought the protection of the municipal council of Pesth. He was arrested, and with some others condemned to four years' imprisonment. In the year 1840, however, the elections were favourable to

the popular party, and a powerful opposition claimed justice for the political prisoners. A general amnesty was the result, and Kossuth was set at liberty. He now married, and undertook the direction of the *Pesth Journal*, which commenced on the 2nd January, 1841, with sixty subscribers. Two months later it had a circulation of 6000. Three years and a half were spent in connection with this journal, when, on account of circumstances relating to the proprietary, Kossuth withdrew; and after ineffectual attempts to found another paper, devoted himself to the establishment of national societies. Count Casimir Bathany was the president of the first society, which, in the autumn of 1846, contained about 154 members, representing the various parts of Hungary. In 1847, when the new elections were to take place, the national party resolved to return Kossuth for Pesth; and so strong was the hold that his principles had obtained, that he was elected by nearly 3000 votes against 1300. The French revolution of 1848 sent a wave of turmoil over the greater part of Europe. In March, 1848, Kossuth moved that the appointment of a Hungarian ministry should be demanded. The proposal was carried by acclamation, and he took his departure for Vienna, accompanied by Count Bathany, to lay the project before the emperor. On the 16th March the Hungarians proceeded to the palace and delivered to the emperor the address of the nation. The demand was granted, and Count Bathany was selected as the first president. At this period there was no intention of separating from Austria, or of impugning the imperial government. But as history has too often shown, the Austrian government could not or would not honestly fulfil its stipulations, and the Hungarian movement soon took a wider range. The facts have been much disputed; but even after this period—namely, at the end of March and beginning of April—it is indisputable that Kossuth was seeking by means constitutional, according to the fundamental laws of Hungary, the political reform of his country.

Now, however, came the crisis. On the motion of Kossuth it was carried in the diet that equality of civil rights and public burdens should be established for all classes without distinction. The Hungarian nobility generally entered into the new movement, and renounced their right to certain lands occupied by the peasants, so that 300,000 peasant families found themselves in possession of from 30 to 60 acres of land each. The electoral suffrage was extended to every citizen possessing £10 of income or £10 of heritable property, to every graduate of the universities, and to every workman employing an apprentice. After an attempt on the part of Vienna to evade these reforms they were confirmed by the emperor, who went to Pressburg in person to give his sanction to them, 11th April, 1848, and they thus became statutes of the realm. Troubles, however, were soon introduced by the Croats, instigated by the agitator Jellachich, and a revolution was the consequence. Jellachich took advantage of the prejudices of the Croats, and persuaded them to adhere to Austria rather than Hungary. Hungarians were murdered without legal remedy, and general confusion was the result. Kossuth now started a new journal, the *Kossuth Gazette*. He was not even yet a revolutionist. But Austria threw off the mask, and in June, 1848, openly took the side of the Croats. The defenders of the country were now organized with extraordinary rapidity, and a severe battle was fought with Jellachich. The second revolution of Vienna broke out in October, and Kossuth directed the march of the army on Vienna. Then followed the battle of Schwechat, which compelled the Hungarians to retire. Windischgratz, the Austrian general, entered Hungary, and commenced a system of wholesale murder. Kossuth and the diet had retired to Debreczin, and there they declared the country in danger. Volunteers came from all quarters

engaged to serve "till after the victory." A new army sprang as it were out of the earth, and the old Polish general, Henry Dembinski, was placed at its head, with Klapka and Repassy as generals of division. We need not pursue the military details; suffice it to say that Austria called in the aid of Russia, that the Hungarians renounced all allegiance to the Austrian emperor, and pronounced the house of Hapsburg dethroned. Kossuth was then by acclamation nominated Governor of Hungary. A "Declaration of Independence" was drawn up and signed, and Kossuth in the name of his country made appeal to France and England. The Russian army determined the fate of Hungary, but not until heroism of the highest order was displayed by the revolutionists.

The political career of Kossuth may be said to have terminated at this point. He had no other course than to leave Hungary, which he did by crossing into Turkey. He was first detained at Widdin, then at Shumla, then at Kutajja, where he was joined by Madame Kossuth and his two sons in February, 1850. In the following year, thanks to the influence of England and the United States, he was able to reach England, and disembarked at Southampton on the 17th October. In 1851 Kossuth went to America in the hope of enlisting the western republic in the cause of Hungary, but met with no success. He returned to England, and honourably employed his great talents in giving public lectures. At the breaking out of the Italian war the ex-governor anticipated that Hungary might also be induced to move, and entered into some negotiations with the Emperor of the French on that subject. In 1866 he issued a stirring address to his countrymen, urging the rejection of the concessions proposed by Francis Joseph. In 1867 he was chosen deputy for Waitzen, but did not accept the office. Since 1862 he has lived mainly at Turin in strict seclusion. In November, 1879, the Hungarian Chamber of Deputies passed an Act declaring any native of Hungary who voluntarily resided abroad for ten years consecutively should lose his civil rights. The measure is believed to have been mainly directed against Kossuth. He has been latterly engaged in writing his memoirs, the last volume of which appeared in 1882.

KOTZEBUE, AUGUST FRIEDRICH FERDINAND VON, a German author, poet, and dramatist, was born 3rd May, 1761, at Weimar. He was educated for the legal profession, but after being admitted an advocate he went to Russia, where he became director of the German theatre at St. Petersburg. He afterwards lived at Vienna, Berlin, Weimar, and at Mannheim. In addition to a busy literary life he took an important part in public affairs, and being an avowed enemy of all liberal ideas and institutions he was employed by the Russian government to forward their interests in Germany. This caused him to be detested as a Russian spy and an enemy to liberty, and on 23rd March, 1819, a theological student, named Karl Ludwig Sand, stabbed him to the heart in his own house at Mannheim. Kotzebue wrote a history of the German Empire, a history of Prussia, and besides other works no less than ninety-eight dramatic pieces, many of which enjoyed considerable popularity. As a dramatist he possessed a remarkable knowledge of the stage, and his plays display keen observation and much command of lively and sprightly dialogue. His life was written by Cramer in 1819, and by Döring in 1830; and collected editions of his works were published in twenty-eight vols. at Leipzig (1797-1823), in forty-four vols. (1827-29), and in forty vols. (1840-41).

KOU'MISS, the name given to a beverage long in use in Russian Tartary, and made by the fermentation of mare's milk. It has been recently introduced pretty largely into medicinal use in this country, and is said to have great nutritive value in some cases of debility, as it can often be digested when ordinary milk cannot. It is

usually made by fermenting ordinary cow's milk, with the addition of a little sugar. It is bottled before the fermentation has ceased, and is thus rendered effervescent. It contains lactic acid and a small amount of alcohol.

KOUSSO or **COS'SO** is an anthelmintic, consisting of the dried flowers and tops of an Abyssinian plant, *Hagenia abyssinica*. The traveller Bruce observed the use made of the plant by the Abyssinians, and published a figure of it. It destroys both kinds of tapeworm (*Tenia solium* and *Bothrioccephalus latus*), but a purgative is necessary as well for expulsion. The tree is a native of the table-land of Abyssinia, at an elevation of from 3000 to 8000 feet. It grows to from 20 to 50 feet high, with pinnate leaves and very numerous small yellowish flowers. It belongs to the order ROSACEÆ.

KRA'AL. In the southern part of Africa, among the Hottentots, a collection of huts.

KRAK'EN (German), a name applied to a fabulous ocean monster or sea-serpent of enormous size. It is described in several old works on natural history, but it is purely a creature of the imagination. Among the earlier poems of Tannysen there is one entitled "The Kraken."

KRAKO'VIAK (Fr. *Cracoviak*), a Polish dance, so called from the well-known Polish town of Cracow. Many couples dance it, in long rows like the English country-dance. The dancers sing and shout, and the scene rises to a great pitch of excitement; the men striking their heels together to make a sharply cracking accompaniment of the same style of effect as that of the Spanish castanets, plates of metal being let into the boots for this purpose. Fanny Elssler was very famous about 1840 in this dance at the Opera House.

KRAN, an Arabian term for a large sum of money. The true amount of a *kran* is 10,000 *pastras*.

KRE'ASOTE. See CHLOROSIL.

KRE'ATIN, **KREAT ININ**. The urine contains a certain amount, rising to nearly a gramme in the twenty-four hours, of a substance called kreatinin, an oxidized form into which kreatin easily passes. This latter is one of the chief constituents of the juices of the muscular tissue. It belongs to the Urea group, and its formula is $C_4H_7N_3O_2$. It is evidently one of the primary products of muscular disintegration, and there is good reason to suppose that it is the predecessor of urea; that is to say, that the kidneys convert the kreatin which they find in the blood into urea. $(NH_2)_2CO$.

KREM NITZ, a mining and royal free town of Hungary, situated 8 miles to the west of Neusohl and 82 miles to the north of Buda-Pest, in a deep valley surrounded by seven hills. Its chief buildings are its town-hall, mint, monastery, and Roman Catholic and Lutheran churches. It has a vitriol factory and some manufactures of vermilion, but is chiefly famous for its gold and silver mines. The town is supplied with water by a tunnel 50 miles long. Population, 9600.

KRETE. See CHRETE.

KREUTZER (from Ger. *Kreuz*, a cross), a well-known Austrian coin, probably originally marked with a cross. The *kreutzer* used to be the sixtieth part of a guilder or florin Austrian; it is now, however, and has been for some years, the hundredth part of a guilder; that is, 2375 of a penny, or about $\frac{3}{4}$ d. The silver guilder, of 100 kreutzers, weighs 12.345 grammes, and is 400 fine; its value is therefore 1s. 11½d. sterling. (The value of the single kreutzer on this basis would be only 2349 of a penny.) The silver ten-kreutzer piece is only 400 fine, but weighs 1.666 gramme; its value is 1½d. The single kreutzer is worth, by this piece, just half a farthing, which is its usual calculation for rough exchange values.

KRIEGS'SPIEL is the German name for a tactical war-game which is said to be of considerable value as a means of higher theoretical military education. It was

known and played during the latter part of the eighteenth century, and several descriptive essays were published between 1780 and 1804. In 1824 a valuable code of rules, elaborated by Herr Domänenrath von Reisswitz, was published by his son, and these may be said to form the basis of subsequent works, though the developments of modern warfare have made numerous additions necessary. In 1872 Captain Baring of the Royal Artillery, better known since as Sir Evelyn Baring, translated and published for the use of the British army the *Kriegsspiel* of Von Tschischwitz, and since the publication of this work the game has enjoyed a limited amount of popularity among military officers in England. The game, which is one of almost pure skill, is played by means of large-scale maps, generally 6 inches to the mile, three copies of which are required, one for each of the opposing players, and one for the umpire. The soldiers are represented by small metal blocks cast to scale, and representing by variation of pattern respectively cavalry, artillery, engineers, and infantry. At the outset certain "general ideas" are given out by the umpire, or a "special idea" towards which the combatants are to work is agreed upon, and the players then advance their forces in turn, in accordance with the rules of the game. Each player at the outset of the manoeuvres sees but his own force, but as the cavalry scouts move forward the umpire announces to each side the information they may be supposed to have gained, and this is reproduced upon the map of their own commander. In accordance with this information the bulk of the force is moved forward to attack or defend, and when the troops are supposed to be actually in collision it becomes the duty of the umpire to give a sketch of the whole of the proceedings, and decide as to which side is entitled to the victory. It is evident, therefore, that both the instructional value of the game and its interest depend upon the genius of the umpire, and this represents one of the chief difficulties in the way of its adoption, for it is found that good umpires are not easy to find. As the element of chance enters into all warfare it is represented in the game by a throw of the dice, but as far as possible the result is made to depend upon the skill of the players.

(See "The Tactical War Game," a translation of General von Verdy du Vernois' "Beitrag zum Kriegsspiel," London, 1884.)

KRIEM'HILD. See CHRIEMHILD.

KRILOFF, **KRINLOFF**, or **KRYLOFF**, **IVAN ANDREEVITCH**, one of the most original and truly national poets that Russia has yet produced, was born at Moscow, 2nd February, 1768 (Old Style). His father, a poor officer in the line, died when the boy was eleven years old, and his mother obtained for him a situation as a government clerk at St. Petersburg. From the study of some old books possessed by his father, he imbibed a taste for literature, and at an early age attempted dramatic composition. His juvenile efforts met with merited failure, but his various attempts at literary composition brought him into notice and gave him an introduction to society. In 1802 he obtained an appointment under Prince Sergius Galitzin, governor of Riga, with whom he remained for some years. In 1809 he published a collection of twenty-three fables, some of which had previously appeared in a magazine, and the approbation they gained induced him to continue the same method of composition. In 1811 an appointment in the Imperial Public Library was bestowed upon him, to which the emperor added a pension; and thus relieved from want and care he passed an easy, indolent, untidy existence, beloved for his kindness and honoured for his genius. His idleness was never allowed to extend to his literary work, on which he spent an immense amount of labour with the most excellent results. The simple originality with which he clothes some of the deepest lessons of practical wisdom in the common but racy language of the

people is in every way admirable, while his verse to the Russian ear appears of matchless beauty. His fables, in addition to their strong local colouring and strictly Russian tone, have also a concealed satire, and an allusion to contemporary events and persons. In 1825 Count Gregory Orloff caused a splendid edition of the fables to be printed at Paris, with versions in French and Italian, and during the lifetime of the poet nearly 80,000 copies of them had been sold in Russia. They were translated into German by Tornøe (Milan, 1842), and an English version in prose, with a sketch of the life of the author, was published by W. R. S. Ralston (1868; second edition, 1871).

KRISH'NA, a popular deity of India who is worshipped as being the eighth *avatar* or incarnation of Vishnu the Preserver. In the great poem of the Mahabharata he appears as a valiant and warlike prince, but in the Ramayana he is hailed as a deity. The allusions to Krishna in the Rig Veda are very obscure, and leave it doubtful whether the same person is intended. Mighty, mirthful, and amorous to an extreme degree, the career of Krishna has ever been a favourite theme for the poets of India, and these qualities serve to make him one of the greatest favourites among the enormous number of gods worshipped by its people.

KRONER, the crown-piece of the Scandinavian Monetary Convention, of which Norway, Sweden, and Denmark are members. It is a silver piece weighing 7.5 grammes, .800 fine, worth therefore a shilling and a half-penny sterling. It is divided into 100 *ore*. There is a gold coinage of 10 kroner pieces weighing 4.480 grammes, .900 fine, worth therefore 11s. sterling. By this piece the single kroner ought to be worth 1s. 1½d.

KRON'OS, the supreme god, in the classical mythology, of that intermediate divine dynasty which came after Ouranos and before Zeus. Kronos (the ripener or harvest god) was the son of Ouranos (the Heaven) by Gê or Gaia (the Earth). He and his brothers and sisters were called collectively the twelve Titans, and Kronos was the youngest. The Titans organized a rebellion against their father, and this ended in the children of Ouranos being thrown into Tartaros. Gaia, enraged at her husband's severity against their children, gave her youngest-born, who was not included in this imprisonment, a sickle, with which he cruelly wounded and mutilated his father. From the blood which fell from the wound sprang the giants, the furies, and other divine beings. The old god, his power gone, was dethroned; the Titans came out of Tartaros, and each god married his sister-goddess. Thus we have Okeanos and Tethys, Kronos and Rhea, Hyperion and Theia, Iapetos and Themis, Koios and Phoebe, Krios and Eurybia or Mnemosyne.

The children of Kronos and Rhea were Haidês (Hades or Ploutôn), Poseidôn, Zeus; Hestia, Dêmêtêr, and Hêra. Of these Zeus was the youngest, and as a prophecy reached Kronos that he would be dethroned by his youngest son, he swallowed each child as it was born. But Rhea gave him a stone wrapped in swaddling clothes when he should have swallowed Zeus, and the infant god was safely cared for in a remote mountain, the Mount Ida. When Zeus had grown to full power he compelled Kronos to disgorge the swallowed children and the stone which had done duty for himself. The latter was long preserved at Delphi. The younger gods at once joined Zeus in an organized revolt against Kronos and the Titans. The rocks of Thessaly were torn in pieces and hurled at one another by the contending forces of the world. Zeus and his brethren had their headquarters on Mount Olympus. Finally Zeus made friends of the Kuklopes (or Cyclopes), deformed one-eyed monsters, children of Ouranos, and the three hundred-handed giants of the same parent, Kottos, Gyges, and Briareus, and with the thunderbolts forged for him by the Kuklopes he succeeded in hurling Kronos and all the Titans into deep chasms, on which great masses of rock, in the

shape of mountains, were piled. The Romans sought to identify their god Saturnus (Saturn) with Kronos.

KRONSTADT. See **CRONSTADT**.

KUB'ELE (*Kubelî*). See **GYBELE**.

KUB'LAI KHAN or **KAAN** (called by the Chinese *Chi-Tsun*), the grandson of GENGIS KHAN, a great Mongol conqueror, was born in 1216. He was the second son of Tuli, the youngest of the four sons of Genghis, by his favourite wife, and after some successful wars with other members of the family he became the successor of the great conqueror about the middle of the thirteenth century. Turning his arms to the subjugation of Southern China he completed its conquest in 1279, having previously, in 1261, founded the city of Pekin and made it the capital of his empire. By this victory he became the ruler of the most extensive empire ever governed by one monarch, his authority being recognized from the Arctic Ocean to the Straits of Malacca, and from the frontier of Poland to the Corea. He adopted and valued the civilization of his Chinese subjects, whose respect he gained by his patronage of literature and the honours he paid to the memory of the earlier rulers of their nation. He endeavoured to promote the instruction of his people, encouraged the visits of learned men from other countries, and sent embassies and expeditions to India, Africa, and even to Madagascar. Among the best known of the visitors at his court is the celebrated traveller Marco Polo, who passed many years in his service, and who gives in his works a valuable and interesting account of the court and kingdom of the emperor. He maintained a magnificent court, and like most conquerors felt dissatisfied with the extent of his possessions, and sought to add to them by force of arms. He sent out armed expeditions against Japan, Cochinchina, and Java, all of which were unsuccessful, and one against Burma, which was overrun and subjugated. These military adventures required immense sums of money, and these being raised by methods common to the East, caused great suffering and discontent, which found vent in revolt and disturbed the internal peace of his kingdom. He died in 1294 and was succeeded by his son Chinghim. His dynasty came to an end in 1368.

KUFIC WRITING, the earliest form of the Arabic characters, derived from the old Syriac character, and introduced to the tribes of Northern Arabia by Moanar ben Morra of Anbar, a city of Hâk, shortly before the time of Mohammed. The letters were rude and clumsy in shape, but they served the Arabs for some centuries, though probably the fact that the Koran was written in this character had something to do with its retention. It derives its name from the town of Kufa on the Euphrates, one of the earliest seats of the caliphs outside Arabia, which contained the ablest Arab scribes and supplied the faithful with copies of the Koran. In the year 76 A.D., equal to 695 A.D., the Caliph Abd el Malek resolved to have a purely Mohammedan coinage, and caused gold and silver pieces to be struck, placing on them, instead of the usual effigy or symbol, passages from the Koran in the Kufic character. Immense numbers of these coins were put into circulation, and many of them are to be found preserved in the numismatic collections of Europe. The oldest coin, dating from the year 696 A.D., is preserved at Milan, but the richest collection of these coins is that of the Academy of Stockholm. It was not until the tenth century that the first form of the current Arabic character now in use was introduced by Ben Moklah, vizier to the caliphs Al Moktader, Al Kâher, and Al Râdi, who formed new and beautiful letters from the old Kufic. These were further improved by Ali ben Bowâb (died 1031), and the new method soon superseded the old for general purposes. For the Koran and for the coinage the older characters were employed for a much longer period, but even for these purposes they gradually fell into disuse, and the Kufic is now only employed for title-pages, inscriptions, &c.

KU-KLUX-KLAN, the name of a secret society in the United States of America, founded by the rebels in the civil war. It was organized in Tennessee in 1868; and its depredations, murders, robberies, and levying of blackmail so alarmed the American citizens that offences attributable to it were made punishable in the Federal courts, and the president was empowered to suspend the Habeas Corpus Act, April, 1871. Before this vigorous attack the conspiracy soon vanished.

KULDJA, one of the most westerly provinces of China, lying almost in the centre of Asia, between the Thian-Shan Mountains and Kashgaria on the south, the Russian frontier on the east and north, and the adjoining Chinese province of Dzungaria on the west. It embraces the fertile valley of the Ili, and here, shut in by lofty ranges of mountains, is the principal town, Kuldja, a busy place, with 70,000 inhabitants. The province of late years has had a history of no little vicissitude and interest. In 1860, at a time when China was distracted by rebellion, and Yakub Beg had made himself master of the great province of Eastern Turkestan, some fierce Taranchi and Tungan tribes dispossessed the Celestial Empire of its Kuldja province. They held it till 1871, when Russia interfered and took possession, promising, however, to restore the province when the Chinese could send an army capable of maintaining order. Such a thing seemed at the time extremely unlikely; but to the surprise of the world, and of Russia in particular, the Chinese forces succeeded in reconquering Eastern Turkestan, Yakub Beg fell, and in 1879 Kuldja was claimed. To give up a province they had held and greatly improved during eight years was a sore trial to Russian ambition. The Chinese, however, were imperative, and four-fifths of the territory was given up, the fifth retained by Russia embracing the finest strategical positions. In 1880, on the return to Peking of Chung How, the ambassador who negotiated this arrangement, the Chinese repudiated the treaty, threw Chung How into prison, and demanded the entire restoration of Kuldja.

KUP FERNICKEL (Gr. *Kupfer*, copper, in allusion to its colour) is an arsenide of nickel (NiAs), containing about 44 per cent. of nickel, and the chief source of that metal; it is usually associated with silver, copper, and cobalt ores. It occurs sparingly in Cornwall, more abundantly in Saxony. Specific gravity, 7.5; hardness, about 5. It occurs mostly massive, but sometimes in crystals belonging to the hexagonal system. Its reddish colour and reactions for arsenic and nickel are distinctive.

KUP FERSCHIEFER, or copper-slate of Mansfeld, Thuringia, is a remarkable deposit of Permian age. It consists of a bituminous shale impregnated with sulphides of iron, copper, zinc, nickel, cobalt, and silver. Fossil remains abound, so that it is supposed the life of that district was suddenly destroyed by the ejection of these metallic salts in connection with some volcanic eruptions of that time. The working of this deposit and the extraction of the several metals from the complex ores has produced the elaborate Mansfeld metallurgical process.

KURDISTAN ("Country of the Kurds") comprehends the larger portion of that mountain region which divides the elevated table-land of Iran (Persia) from the low plains of Mesopotamia or Al-Jezireh. As it does not constitute a political division its boundaries are not exactly determined; but the latitudes vary between 34° and 38° N., while the width of this mountain region is about 100 miles. About three-fourths are under the dominion of the Turkish sultan; the remainder belongs to Persia. The mountain ranges, with which the country is almost covered, and which in some cases rise to a height of 13,000 feet, divide the surface into fertile valleys and extensive table-lands.

The largest river of Kurdistan is the Zab Ala, or Great Zab. It rises within the boundary of Persia, at an elevation of about 7,000 feet above the sea-level, receives by its

numerous affluents the drainage of almost the whole of Northern Kurdistan, enters Southern Kurdistan by a narrow glen, and joins the Tigris about 30 miles below Mosul. At the place of their confluence the rivers are nearly equal in size. The other large rivers of Kurdistan are the Zab Asfal, or Lesser Zab, and the Diyalah. They rise in the elevated region dividing Southern Kurdistan from the table-land of Iran, and after draining the first-mentioned country they fall into the Tigris. A sultry and vehement east wind, resembling the sirocco, is the terror of the country. The soil is generally parched in summer, but verdant during the wet season.

The fields of Kurdistan produce wheat, barley, and Indian corn; millet and rice are grown only in the lower districts towards the banks of the Tigris. Tobacco and cotton are largely cultivated, and supply articles of commerce. Fruits of various kinds are grown, but the only cultivated ground is near the villages. The country also yields the remarkable vegetable substance known as manna, but called in Turkish "the divine sweetmeat." It is found on the leaves of the dwarf oak, the flowering ash, and other plants. The Kurds go out before sunrise, after rainy or dewy nights, to collect it, spreading cloths under the trees, and shaking down the manna from the branches. The castor-oil shrub abounds near the Tigris, and the slopes of the hills are covered with different kinds of oaks, some of which furnish the finest nut-galls of commerce. Sheep, cattle, and horses abound. A great trade is carried on in the latter with Turkey and Persia, the Kurdish breed being so famed for its spirit and endurance as to be almost exclusively employed in the Turkish and Persian cavalry. There are bears, wild hogs, wild goats, antelopes, jackals, and land-turtles. Bees are abundant. Minerals are scarce, except building-stone. In the mountain region iron and sulphur are met with. There are several salt springs, and also springs which yield naphtha and petroleum.

As the passes through the ranges of mountains and hills are difficult, and single travellers are subject to be robbed and murdered, commerce is carried on by caravans. At least one caravan departs every month from Suleimaniyeh for the Persian towns of Tabriz and Hamadan. There are other caravans to Hamadan for goods from Bagdad, to Mosul for goods from Damascus, and to Erzeroum for goods from the Black Sea. The population of Turkish Kurdistan is estimated at about 2,000,000, of which four-fifths are Kurds, and the remainder Armenians, Persians, Jews, and Turks. The Kurds are a stout race of men, of dark complexion, with black hair, a large mouth, small eyes, and a savage look. Their language is derived from the same stock as that of the modern Persian; but not having been fixed by writing it has degenerated, and is divided into many dialects. In Turkish Kurdistan the nation is composed of two castes, the warriors and the working people or agriculturists. The Kurds are Mohammedans.

The Kurds were known to the ancients. When subject to the kings of ancient Persia they belonged partly to the province of Assyria and partly to Media. After the time of Alexander their country was united to the kingdom of Syria, but was dismembered from it in the third century before Christ by the Parthians. It afterwards became a part of the new Persian Empire, and fell with it under the dominion of the caliphs of Bagdad. After the destruction of the caliphate Kurdistan partook of the numerous revolutions in Persia and Mesopotamia. The famous Sultan Saladin was a Kurd, and appears to have got possession at least of a part of the country. But it soon passed under the dominion of the Mongols (1258), and finally (1388) was conquered by Timur. After the establishment of the Sufi dynasty (1502) Kurdistan constituted a part of Persia, and remained so till the seventeenth century, when the Kurds, oppressed by the Persians, revolted, and submitted themselves to the dominion of the Turkish

sultan. The country abounds in memorials of the past, the chief, in point of interest, of which is perhaps the first temple of Pai Kulu on the southern frontier of Suleimaniyeh.

KURILE ISLES, a series of twenty-five islands extending between Kamchatka and the island of Yesso, since 1875 belonging to Japan. They are all of volcanic origin, consisting of high masses of lava. Fifty-two distinctly volcanic peaks, of which at least seventeen show signs of activity, have been observed. The vegetation is scanty, and on those near Kamchatka trees do not grow; but the southern islands are more fertile, especially Kunashir and Iturup, on which the Japanese have settled. The number of inhabitants is very small, and has been estimated at from 200 to 300. They live mostly by hunting and fishing, the products of which they barter to Russian, American, Japanese, and Dutch traders. There are large quantities of beavers in the islands.

KURRA'CHEE. See KARACHI.

KURSK or **KOURSKE**, a government of European Russia, bounded N. by Orel, E. by Voronetz, S. and W. by Kharkov and Tschernigov. Its area is 17,433 square miles, and the population 2,308,214. The surface of the province is undulating. It contains no mountains, but is traversed by many small eminences. There are no navigable rivers or large lakes, nor are the forests extensive. The east and south parts of the government belong to the basin of the Don, and are drained by numerous small streams that fall into the Donetz; the western and northern parts are drained by the rivers that form the Seim, a feeder of the Desna, which falls into the Dnieper. Kursk is one of the most fertile provinces of the empire; the soil is so rich that it needs no manure; but the system of agriculture is very rude. The chief products are rye, wheat, barley, oats, pease, buckwheat, millet, poppy, hemp, hops, tobacco, and flax. Corn, of which there is always a large surplus for exportation, is sometimes kept in caves or pits for five, six, or even ten years. Horticulture is very general and successful; apples, cherries, plums, pears, hazel nuts, and melons are grown. Fuel is scarce; straw and dried cow-dung are used as substitutes for firewood. The breeding of oxen, horses, and sheep is carried on very extensively, and the inhabitants keep great numbers of swine, domestic poultry, and bees. The minerals are iron, limestone, flints, and saltpetre. The manufactures comprise coarse woollens, leather, tallow, soap, saltpetre, and pottery. The exports consist chiefly of the natural productions of the country.

KURSK, the capital of the government, a town of 35,000 inhabitants, situated on the right bank of the Seim, 330 miles S.S.W. of Moscow, is the residence of the military governor of Kursk and Orel, and of the bishops of Kursk and Belgorod. The old ramparts have been converted into walks and gardens. The streets are narrow and crooked. There are numerous churches, including two cathedrals, two convents, an ecclesiastical seminary, a gymnasium, hospital, several manufactures of leather, wax, and tallow, and an active commerce. It is the see of a Greek eparchy. A large annual fair is held near here in July, when goods are sold to the value of £1,000,000.

KURTIDÆ is a small family of fishes belonging to the order ACANTHOPTERYGII. The Kurtidæ are inhabitants of shallow waters in tropical seas. There is only a single short dorsal fin with few spines; the anal fin is longer than the dorsal, and provided with many rays. The body is compressed and oblong, with a short snout. Fine conical teeth are present in the jaws, and on the vomer and palatine bones. Only two genera are known, Kurtus and Pempheris, in neither of which are the species numerous. In Kurtus the air-bladder is lodged within the dilated ribs.

KUTA'IS, a government of Transcaucasian Russia, on the Euxine, between the Caucasus and the Turkish territories.

The surface rises steeply on both sides towards the mountains north and south; it is richly wooded and extremely fertile. The western part is a level plain for 30 or 40 miles above Poti, apparently a former bay of the Euxine. The Rion or Phasis traverses it nearly in the middle, and the railway from Poti to Tiflis passes through it. It has an area of 8095 square miles, and a population of 851,178.

KUTAIS, the most ancient town of the Caucasus and the capital of the above government, is situated 60 miles to the east of Poti, near the Poti and Tiflis Railway on the right bank of the Rion. The prosperity of the town is now increasing, and there is some trade in grain and wine, and a manufacturing industry in silks and hats. As *Cutatisium* or *Czetää* it was the capital of Colchis, and it contains the ruins of a cathedral of the eleventh century and of an ancient fort. Population, 9000.

KUYP or **CUYP, ALBERT** (1605-1691), the son and disciple of Jacob Gerutze Kuyp, a landscape painter of Dort, was born at Dort in 1606. Scarcely anything is known of the circumstances of his life, except that he was a rigid Calvinist of retired habits. He was of considerable estimation with his fellow-citizens, however; for William III., when stadtholder of the Netherlands, had his name sent into him, in 1672, on the list of those who were to fill the regency of Dort. Kuyp is a great favourite in England, and it is here that his finest works are found. He has been called the Dutch Claude. The golden glow of his landscapes quite merits the appellation. He painted only the scenery near Dort, the rivers Rhine and Meuse and their banks; but he painted this with a love and an intimate knowledge of its every detail which are simply perfect. His cattle are faultless portraits; his weeds, his waves, his ripples are nature herself.

KY'ANITE (Gr. *kyamos*) is a triclinic silicate of alumina, occurring in long thin blade-like crystals, generally of a blue colour, or white with a bluish tinge, and remarkable for being much harder on the ends than the faces of the prisms; hence it is sometimes called *Diatheue*. Hardness, from 5 to 7.5; specific gravity, 3.5. It occurs mostly in gneiss, mica schist, or similar metamorphic rock, associated with such minerals as garnet, staurolite, &c. In *kyanite rock* it is aggregated with red garnet, green smaragdite, and silver-white mica. From its resemblance to sphalerite it has been used as a Gem.

KY'ANIZING, a method of preserving timber from Dry Rot introduced by John H. Kyan (born in Dublin, 1774; died at New York, 1850). It consists in the injection into the pores of the wood of a solution of corrosive sublimate or bichloride of mercury by means of an air-pump. Though most efficacious in protecting timber from all fungoid growth, it has to a great extent been superseded by other methods—such as creosoting. See CREOSOTING.

KYD, THOMAS, was one of those dramatic poets who immediately preceded Shakspeare. Three plays of his are extant—"Cornelia," "The First Part of Hieronimo," and "The Spanish Tragedy, or Hieronimo is Mad Again." All the three are in Dodsley's "Old Plays." As a writer of blank verse Collier places him next to Marlowe among the predecessors of Shakspeare.

KYMOGRAPH, an instrument for noting the variations of pressure in the arteries of the human body or of the bodies of animals. It is usually self-registering.

The blood in the arteries is always subject to pressure not only during the contraction of the left ventricle, but in the intervals between the contractions, for while the coats of the artery are thrust out and stretched during the stroke of the heart, they are so elastic as to press forcibly on the blood when the stroke of the heart has ceased and the ventricle is filling for the next stroke.

The pressure is measured by a column of mercury in a tube, on the principle of the barometer, and the variations in the height of the column are recorded by means of a little

floating piston, whose vertical rod carries a short horizontal pen which traces its own movements upon a revolving sheet of paper, so that a vertical rise and fall is represented by a waving line and is readily deciphered. In this way it has been found that the pressure of blood in the carotid artery of a rabbit supports a column of over 2 inches of mercury, in that of a dog over 4 inches, in a man $5\frac{1}{2}$ inches, and in a horse from 8 to 12 inches. The total pressure on the human aorta is $4\frac{1}{2}$ lbs., and on the aorta of a horse $11\frac{1}{2}$ lbs. The pressure at the well-known point on the human wrist where the pulse is so well felt, is only 4 drachms. All these measures are for the time of the heart's stroke.

KYRIE ELEISON, a Greek phrase, signifying "Lord, have mercy." It is the name given to a form of prayer common to the ancient Greek, the Roman Catholic, and the Anglican liturgies. In the Roman mass it follows the introit, and forms the introduction to the hymn, "Gloria in excelsis Deo." The Greek words are still used in the mass, being, as Dr. Milman says, one of many evidences of the predominance of the Greek element in the early Roman Church. In the English Prayer-book it is translated as "Lord, have mercy upon us," and is placed between the Creed and the Lord's Prayer in both morning and evening services.

L

L, the first of the letters which used to be called *liquids*. These were *l, m, n, r*, but it is difficult to find any link between *l* and *r* and *m* and *n*. The two first form a pair of front palatal consonants closely connected, for while in both the tongue is raised with the tip just behind and above the teeth, in *l* the tip touches the inside of the gum and the breath escapes on each side of the tongue, whereas in *r* the sides of the tongue cleave close to the teeth, and the lip is left free to vibrate in the well-known manner. *L* is formed at that part of the palate which is near the teeth. It is identical with the Greek *lambda* and the Hebrew *lamed*, and is found in almost every language. As a numeral *L* represents fifty in the Latin alphabet. Really in this sense it is not the letter *L* but half of *C*, the archaic form of *C*, the Latin sign for 100. Half *C* was therefore *L* or 50.

The figure of the letter has always been expressed by two lines at an angle; and in some ancient Greek alphabets it stands as Λ , whilst in others it is \angle . From these two forms come the Greek Λ and the Latin *L* respectively. The interchanges to which it is liable are as follows:—

1. *L* is interchangeable with *r*. Hence from the Greek, or rather Latin, *apostolus, epistola*, the French have derived *apostre, apôtre; épître, épître*. We get *lavender* from Lat. *lavendula*, *colonel* from Spanish *coronel*.

2. *L* with *n*, as *Barcino* (gen. *-onis*), *Barcelona*; *Ruscino, Roussillon*; *Bononia, Bologna* or *Boulogne*; *litron, nitrum*; *anima, alma*.

3. *L* with *d*, as *St. Agilius, St. Giles*; *grülron*, meaning *grill-iron*; and the English title *admiral*, derived from the Spanish *almirante*. *L* is also interchangeable with *t*.

4. *Ll* in the middle of words with *li*. Examples of this are abundant in the French pronunciation of the *l mouillé*. Hence from the French *billards* is derived without much alteration of sound the English *billiards*. This change prevails between the Greek and Latin languages, as *phutton* and *folium*, a leaf; *allos* and *alius*, other; *hallomai* and *salio*, I leap. With these forms may be compared *Mallorca* (pronounced *Mayorca*), the Spanish name for *Majorca*. Lastly, the Portuguese write *lh* with the same sound.

5. *L* disappearing. Not very dissimilar from the preceding section is the Italian interchange of *pl, cl, fl*, with *pi, chi, fi*; as from *plenus*, full, *pieno*; *planus*, flat or low, *piano*; *clavis*, a key, *chiave*; *clarus*, bright, *chiaro*; *clamare*, to call, *chiamare*; and *flos* (gen. *floris*), a flower, *fiore*; *Florenza*, once *Fiorenza*, now *Firenze*, the name of Florence.

This loss of an *l* after a consonant appears in other languages. The German *fliehen*, to fly, has for its chief

element *flug*, corresponding to the Latin *fug*. In the same language *flispem* and *flapem* both mean to whisper; *flittich* and *fittich* both mean a wing; *blinzen* corresponds to the English words *blink* and *wink*.

6. *L* with *u*, particularly after an *a*. *Alfidena*, a town, or *Aufidena*; Gr. *eleémouné*, pity, Ital. *limosino*, Fr. *aumône*, Eng. *alms*; Lat. *altar*, an altar, Fr. *autel*; Lat. *aliqui-uno*, Ital. *alcuno*, Fr. *aucun*; Lat. *ulua*, Fr. *aune*. The French also contract the preposition and article *à le, à les, to au and aux*.

7. Many words beginning with an *l* once had other consonants before the *l*, as in Latin *locus*, a place, *litis*, a suit, *latus*, broad, which were once preceded by *st*—thus, *stloco-*, *stliti-*, *stluto-*. This explains how *latum* in Latin is the participle of *tollo*. It must once have been *tlatum*, corresponding to the Greek forms of the same root—viz. *tle-môn*, as well as *tol-mé*.

8. *L* is very apt to appear in a root, sometimes before a vowel, sometimes after one, as in the Greek words *kale-* or *klé-*, *bal-* or *blé-*, &c. Where this slipping occurs after a sound like *k*, the *l* is apt to be converted into an *r*. Thus the Greek *skalekein*, to poke, is in Latin *scrutari* (compare the phrase *scrutari ignem*, to poke the fire). *L* has disappeared in *each* (Old Eng. *ale*), *which* (Old Eng. *horylc*), *suck* (Old Eng. *scycle*), *England* (Old Eng. *Engle-land*).

LA, in music, used by the French and the Italians, is synonymous with our note *A*.

LA FONTAINE, JEAN (sometimes written *Lafontaine*), the famous fabulist and story-teller, was born at Château-Thierry in the year 1621, and died at Paris in 1695. He was the son of a ranger of the royal forests, and himself inherited this tolerably lucrative post. He was a careless, idle, feather-headed sort of fellow, and married a girl of sixteen when he was twenty-six, had children, quarrelled, and separated. As soon as the couple were apart they became excellent friends, and always kept on amicable terms—at arm's length. La Fontaine's affairs were in the greatest disorder, and he went to Paris to try and better them. Here a certain facility in turning an anecdote or a copy of verses pleased the magnificent Fouquet, the superintendent of finances. He advised La Fontaine seriously to study literature, and as a help toward it gave him a pension of 1000 livres. It is to La Fontaine's eternal honour that at Fouquet's death, amid circumstances of cruel disgrace, he was faithful to his early patron, and composed and published a very elegant lament, the best known of all his serious poems, beginning (or rather having as its second line) "Pleurez, nymphes de Vaux," Vaux being Fouquet's famous estate. Still La Fontaine, in his heedless happy-go-lucky way, had finished scarcely anything, had published scarcely any-

thing. His talents, now perfectly recognized in spite of his laziness, procured him an asylum with the Duchess of Bouillon, and he began to polish up his famous "Contes" (Tales). The first portion of them appeared in 1662, and the exquisite felicity of the language and the charm of the easy style, whose simplicity concealed the most consummate art, at once placed him in the very forefront of literature. Even Boileau, the cold, critical, cynical autocrat of letters, was won from his usual indifference; Molière welcomed him with open arms, and Racine received him cordially. The four great men soon met weekly by arrangement for a dinner and a confidential literary talk after dinner at the tavern in the Rue du Vieux Colombier, which their meetings have immortalized. The second part of the "Contes" appeared in 1667, and the third in 1671, and detached stories came afterwards from time to time. La Fontaine could no longer leave Paris, so full of delight to his easy nature. He sold his place at Château-Thierry and continued to live with one titled family after another. All were ready to receive so charming a guest. His favourite resting-place was with Madame de la Sablière. From her house were sent out the first of the immortal fables in 1668, dedicated to the dauphin, and the second in 1679, dedicated to Madame de Montespan. The priest-ridden court of the old Louis XIV. were somewhat mollified by the fables, having previously looked askance upon the teller of the tales, not only for their too free treatment, but for the want of respect shown to religion, or so they judged it, in the poet's life as well as his works. This charge is ridiculous, but the first objection is unfortunately well founded. Fascinating as they are to the student, no father would dare to put La Fontaine's "Contes" into the hands of his daughter; and it is a real loss to the gaiety and pleasure of the world that (like Boccaccio) he allowed himself to be swayed by the lower instead of the higher imaginative current of the time. On the other hand, the fables are as strictly pure as the tales are over-free, and have immortalized their author. At the time, however, the "Contes" were all too famous. Consequently when Colbert, the great chancellor, died in 1683, and La Fontaine canvassed for the vacancy in the Academy, the king refused his assent upon the election of La Fontaine over Boileau (the court candidate) by a large majority. What would have been done we cannot now say, if a member had not died just at the time and so permitted both candidates to be received. Louis assented to La Fontaine's election in a most ill-humoured speech. The Duke of Burgundy, the father of Louis XV., was a great lover of La Fontaine, and had been trained to this by his tutor, Fénelon, himself a writer of peculiar ease and eloquence. Just before his death, hearing that the shiftless man was again without resources, he sent the poet every louis he had by him. The third part of the fables, which appeared in 1693, was dedicated to the duke.

LA PAZ, a city and the capital town of Bolivia, situated about 40 miles to the east of Lake Titicaca, in a deep valley at the foot of the snowy peak of Illimani, at a height of nearly 12,000 feet above the sea. Its chief buildings are the cathedral, a Jesuit church, the university, and a palace. It is the seat of a bishop, and has considerable trade with La Plata and the west coast, especially in coca and cinchona. The town was founded in 1548. Population, 80,000.

LA PLATA or **RIO DE LA PLATA** is a large river, or rather estuary, 200 miles in length, in South America. Where it enters the sea, between Punta del Este and Cape San Antonio, its width is 140 miles; and between Punta de las Piedras and the Barrancas de Santa Lucia above Monte Video, it is still 53 miles wide; but higher up the shores gradually approach nearer, and opposite Colonia they are hardly 20 miles apart. The

estuary continues to preserve this width to the confluence of the Parana and Uruguay, the two large rivers which fall into it. At its mouth it is only 10 fathoms deep on an average, and this depth gradually decreases. Every part of it is shallow and difficult to navigate, especially during the prevalence of the south-western gales, which blow with inconceivable fury.

Through this estuary the commercial produce of about one-fourth of South America is brought to the market of the world. It is therefore a great advantage to the countries from which the Plata receives its waters that the rivers which flow into it offer less obstruction to navigation than is usual in large streams. These rivers are many of them large; the chief are the Parana, Uruguay, Paraguay, Pilcomayo, Vermejo, and Salado. The muddy waters of the Rio de la Plata can be traced in the ocean 200 miles from its mouth. The name signifies "river of silver," and hence the United La Plata Provinces, of which it is the northern boundary, are now called the Argentine Confederation, from the Latin *argentum*, silver.

LA PLATA is also the name of a new city of the Argentine Republic, the capital town of the province of Buenos Ayres.

LA ROCHEFOUCAULD. The most remarkable writer of a particular kind was François de Marcellac, duc de la Rochefoucauld. His sole aim was, having got a grain of thought, to grind it, set it, and polish it until it was absolutely perfect. If a thought was expressed in fifteen words which could be expressed in twelve the duke spent weeks upon the task of excising the three redundant words without weakening the force or clearness of the sentence. Thus it comes that the whole literary production of a long life of one of the cleverest men who ever lived is a short volume of Memoirs and a collection of 504 very short sentences, many of one line, some of two or three, very few indeed over four. Fifty more sentences or "Maxims" (*Maximes*) were said to be found still unpublished after his death, but their authenticity is dubious, and they are far beneath the level of the rest; also there were fifty which the duke's fastidious taste had rejected from time to time from previous editions, though most of them are beyond the reach of any author but himself.

La Rochefoucauld was born in 1613. His father having just been created a duke, then a very unusual honour for a French subject, as it was the highest title under the crown. The subject of this article was called during his father's lifetime Prince de Marcellac, prince being not so elevated a title as duke in the French court. He spent but little time in his education, as was then the custom, and when still scarcely more than a boy entered the army and (which was the same thing in all the higher commands) was seen at court. The Fronde spirit was beginning to stir, and it was considered *de rigueur* for brilliant young noblemen to make a set against Richelieu. La Rochefoucauld was further induced to meddle in the perpetual and tortuous intrigues against the great cardinal by his love for the beautiful arch-plotter Madame de Chevreuse. Richelieu died, Mazarin succeeded. La Rochefoucauld transferred both his love and his hate. Madame de Longueville now ruled his heart and intrigue against Mazarin his head, and soon he found himself one of the leaders of the Fronde. This was a nickname given to an attempt of the great nobles, and even some of the royal princes, to limit the authority of the crown, which had been long growing up, and at last resulted in a civil war of a kind quite unexampled. It is exceedingly difficult always to understand what the Frondeurs were fighting for beyond mere personal objects, and what is quite certain is that many of them did not know themselves. La Rochefoucauld fought with the Fronde all through the civil war, and won a reputation for the most reckless bravery. At length the astuteness of the cardinal, the courage and statesmanship of the queen (Anne

of Austria), and a sense of the absurdity of this interminable conflict, won all men to consent to a peace, and the young king's authority was firmly settled—to grow as time went on together with his own growth, till it culminated in that despotism of the Grand Monarque which made him the cause of so many woes to France. La Rochefoucauld retired in disgrace at the peace, but afterwards he was seen at the court of Louis XIV. He became gouty in his old age, and found much consolation in the devoted attachment of a very talented and beautiful authoress, Madame de la Fayette, who had invented a sort of tale of contemporary manners which, under the name of the *Novel*, was quickly to replace the old "romances." His clever friend has sketched him for us as the "Duc de Nemours" in her famous novel the "Princesse de Clèves." A still more famous literary friend, though not so exclusively attached to him as Madame de la Fayette, was the celebrated letter-writer Madame de Sévigné. La Rochefoucauld died of a severe spasm of gout in 1680.

Five editions of the "Maxims" were published during the duke's life, the first in 1665 and the last in 1678. In fact the number of editions was only limited by his life. The slightness of the changes made in many cases is one of the curiosities of literature. It is safe to say that, as we now have them, these maxims could not be expressed in French in fewer or in more pithy words. They are so perfect that it takes much study to fully realize their immense art. Nothing I ever saw accomplished at all comparable to them, and but very little indeed has been attempted in this style. It is one man setting to work to coin proverbs, that is, by incessant polishing, to do in one lifetime that which in a natural way takes centuries to accomplish. La Rochefoucauld frankly avows as his motto, "Nos vertus ne sont le plus souvent que des vices déguisés (Our virtues for the most part are only vices in disguise), and this cynical man-of-the-world way of looking at life runs through all his work. As a code of morality it will not excite our admiration, but it puts up for being no code of morality. It is simply the fruit of a long experience in a rather selfish and corrupt epoch; and without saying that such things are right, it states the fact that such things were. Much of it is but too true after all. As a specimen of the continual polishing to which the Maxims were subjected we may instance the famous No. cclxxi, which stood in the first edition thus—"La jeunesse est une ivresse continuelle, c'est la fièvre de la santé, c'est la folie de la raison (Youth is a continual intoxication, it is the fever of the health, the madness of the reason), but the second clause of which is altered in the later editions to simply "c'est la fièvre de la raison" (it is the fever of the reason). Few, very few, authors would have been courageous enough to sacrifice so magnificent an antithesis for the improved point of the whole. Yet any one comparing the final edition of the maxim—"La jeunesse est une ivresse continuelle, c'est la fièvre de la raison"—with the first, must acknowledge that it is as a whole infinitely superior.

Space forbids imperatively anything like detailed criticism of these marvellous maxims; but one or two taken quite at random may be quoted as samples, in the hope that a reader may resort to the immortal work whence they are drawn. The numbering is that of the 1678 edition.

xix. "Nous avons tous assez de force pour supporter les maux d'autrui" (We all have strength enough to bear up against the misfortunes of others). This remains in the final edition; but there is a maxim somewhat like it which the author struck out, but which nevertheless is more frequently quoted than any other in attacks against La Rochefoucauld's cynicism. It is No. xcix in the 1665 edition, and runs thus—"Dans l'adversité de nos meilleurs amis nous trouvons toujours quelque chose qui ne nous déplaît pas" (In the misfortunes of our best friends there is always something not altogether unpleasant to us).

xlv. "On n'est jamais si heureux ni si malheureux qu'on s'imagine" (We are never so happy nor so unhappy as we think we are).

ccxxviii. "On aime mieux dire du mal de soi-même que de n'en point parler" (We prefer to speak ill of ourselves, than not to speak at all on the subject). Coupled with this we may add ccxxix—"On croit quelquefois haïr la flatterie, mais on ne hait que la manière de flatter" (We may think we hate flattery, but it is only the way in which it has been administered that we dislike).

cii. "L'esprit est toujours la dupe du cœur." Here, fortunately, one of the finest of the poets of our time (A. H. Clough) has used this as the motto of a charming poem, and his rendering, though not so terse, is as good as the original. It runs:—

"Ah yet, when all is thought and said,
The heart still overrules the head."

ccxxviii. "L'hypocrisie est un hommage que le vice rend à la vertu." (Hypocrisy is the homage of vice to virtue). This is perhaps the gem of these maxims.

LA ROCHELLE, a town of France, the capital of the department Charente Inférieure and of the former province of Aunis. It stands on the north side of a small inlet, which extends about 2 miles inland and terminates in a salt-marsh, 295 miles south-west from Paris, and has 19,670 inhabitants. By the marriage of Eleanor of Guienne and Poitou to Henry II., the town came into the hands of the English kings, from whom it was taken by Louis VIII. in 1221, again ceded to them by the treaty of Breteigny in 1360, but finally recovered by Bertrand du Guesclin in 1372. The Huguenots held it from 1557 to 28th October, 1628, when the garrison, reduced by famine, surrendered to Louis XIII., who demolished the fortifications. The present defences were erected by Vauban. The entrance to the inlet which forms the outer harbour is defended by forts. The inner harbour, round which the town is built, consists of two basins, both surrounded by fine quays, and one of them is closed by floodgates, whereby ships are kept constantly afloat. La Rochelle has peculiar advantages in its safe and easily-gained roadsteads. The town is well built, with broad straight streets, and houses adorned with porticoes, but of no great elevation. The finest square is the Place-du-Château, three sides of which are planted, and serve for promenades. Outside the walls there are two other extensive walking grounds, called Place-du-Mail and Champ-de-Mars. The chief buildings are the cathedral, the town-house, the exchange, the tower called *Porte-de-l'Horloge*, the marine baths, and the public library, which contains 20,000 volumes. The exports consist of the produce of the department, the imports of colonial and English produce. The town is the seat of a bishop, has tribunals of first instance and of commerce, a college, mint, school of navigation, besides numerous glass-works, sugar-refineries, potteries, shipbuilding yards, and cotton-yarn factories. Rochelle salts (a purgative) was discovered here by Seignette the chemist. Réaumur, the philosopher (whose division of the thermometer is in general use in France), was a native of the town.

LA VENDÉE. See *VENDEE*.

LAALAND (pronounced *Lo'lahnd*), an island in the Baltic, at the southern entrance to the Great Belt. It forms a part of the kingdom of Denmark, and is the seat of a bishopric. The area of the island is about 462 square miles, and its population is about 90,000.

LA'BARUM, the famous standard of Constantine the Great, which he designed in remembrance of the vision of a cross in the heavens that occurred to him on his march against Byzantium. The Greek historians describe it as a long pike surmounted by a crown of gold, the crown inclosing a monogram of the first two letters of Christ's name. From its shape it also served as an emblem of the

Cross. A silken banner hanging from it was embroidered with the figures of the great emperor and his family. It was jealously preserved for many generations, and carried before the Greek armies in terrible emergencies, as if it could insure the safety of the empire. On Constantine's medals it is accompanied with the legend, which he professed to have seen blazoned in the skies, *En toutô nika* (conquer by this).

LAB'DAKOS (Lat. *Labdacus*), founder of a house whose fatal career yielded one of their favourite subjects to the Greek dramatists. His son Laios, his daughter-in-law Jokastê (Lat. *Jocasta*), his grandson Oidipous (Lat. *Edipus*), and the sons and daughters of this last, especially the heroine of heroines, Antigônê, all bear the terrible curse weighing on the "house of Labdakos."

LAB'DANUM or **LAD'ANUM** is a viscid resinous exudation from the leaves and branches of various species of *Cissus*, especially from *Cissus cretica*. It possesses stimulant and expectorant properties, and at one time was much used for dysentery and catarrhal affections. The Turks use it for fumigation. The collectors in Crete are armed with a kind of rake with leathern thongs attached, and with this they brush the shrubs during the hottest part of the day, and afterwards scrape off the resin. In Cyprus the shepherds obtain it by combing the fleeces of their flocks.

LABERIUS, DECIMUS, was a Roman knight (*eques*), the only part of whose career which concerns us being his connection with Cæsar. Laberius was very famous as a writer of *mimes* for amusement, satiric extravagant monologues; and Cæsar offered him a heavy sum to contend upon the stage as an actor in his own mimes with a certain Syrus, who had challenged the world (B.C. 45). Laberius, a nobleman, dared not refuse the all-powerful dictator, although he lost his caste by the service, according to the low estimation of the actor's art. He revenged himself by attacking Cæsar in a pungent prologue, very famous, which is yet preserved. He died, some say of shame, two years afterwards. But Mommsen points out that as he took the promised money, his gibes at the tyranny which had degraded him, a nobleman of sixty, to the work of a slave, must be taken *cum grano salis*. The anecdote is, however, often quoted.

LABIALS (Lat. *labium*, a lip). The letters *b, p, v, f, m, w* are so called because the lips are chiefly employed in their pronunciation.

LABIATÆ, a very extensive and important order of plants belonging to the GAMOPETALÆ. The species are generally aromatic and tonic—a property which is in most cases owing to the secretion of a volatile oil in little cysts or glands occupying the leafy organs. The aromatic qualities are familiar to us in the sage, marjoram, thyme, basil, and similar plants, commonly cultivated for the service of the kitchen as condiments; in lavender, so much valued for its peculiar fragrance; in mint and peppermint, well known for their stimulating power, and in many others. Betony, ground ivy, horehound, and others are examples of the bitter tonic qualities of such plants. The corolla is irregular, the stamens didynamous, the ovary four-lobed, with the style arising from the base of the lobes; the fruit splits into four one-seeded nutlets, and is generally inclosed in the persistent calyx. The leaves are opposite, and the stem four-cornered.

LAB'LAB, a name of Arabic origin, adopted by botanists formerly to designate a genus of papilionaceous LEGUMINOSÆ of the tribe Phaseolæ, or tropical pulse, but now included in the genus *Dolichos*. The cultivated varieties all belong to the species *Dolichos Lablab*, which is widely distributed throughout the tropics of the Old World. It takes the place of our bean, but as the seeds are not palatable they are only eaten when there is a scarcity of rice. They afford excellent food for cattle, and are very nutritious. In one variety the young pods are eaten. They are twining

herbs with three-foliate leaves; the flowers are red, purple, or white.

LABLACHE, LUIGI, a very famous bass operatic singer, whose greatest triumphs were in comic parts, was born at Naples 6th December, 1794, and died at Naples 23rd January, 1858. He was an immense favourite in England, and had the honour of being Queen Victoria's singing-master. His voice was of enormous power, and his physical strength and huge size were to match, while all these mighty powers were dominated by the soul of a really great artist. One of his daughters married Thalberg, the composer and distinguished pianist.

LABORATORY, ROYAL, a department of Woolwich arsenal for the manufacture of warlike stores; it has been in existence for many years, and in 1855 was considerably enlarged and improved. Here are made shot, shell, bullets, percussion-caps, cartridges, and all kinds of ammunition. The machinery is of a very ingenious and powerful description.

LABOUR. See WAGES.

LABOURERS, STATUTES OF. These famous statutes, the earliest poor laws, arose after the frightful devastations of the plague called the Black Death in 1348, because of which it was found necessary to pass in 1349 an ordinance (23 Edw. III.) regulating the wages to be paid to labourers, and making it illegal to relieve an able-bodied pauper, while all such were compelled by other clauses to go to work, under severe and even barbarous penalties. The object was to discourage the idleness encouraged by the lavish gifts of the monasteries, while the land lay starving for hands to till it. In 1351 was enacted the *Statute of Labourers*, which still further added to the provisions mentioned above, and this was extended under Richard II. (1388) by the proviso that paupers were to remain in the place of their birth, while it was limited, on the other hand, by the renewed freedom to beg under the protection of a license.

LAB'RADOR is the name of a vast peninsula of British North America, between lat. 49° and 63° N., lon. 55° and 79° W., bounded south by the Gulf of St. Lawrence, east by the Atlantic Ocean, west by Hudson Bay, and north by Hudson Strait. Its area is estimated at 70,000 square miles, and the population at 5000. The region was discovered by Cabot in 1496, and re-discovered by Hudson in 1610. It is very thinly peopled by wandering tribes of Indians, and in the northern coasts by nomadic Eskimos. The name, which was given to it by its Portuguese discoverers, means cultivable land, but the interior of the country is elevated, and is traversed N.E. by a range of mountains continued from Canada, the loftiest of which is Mount Thoresby, nearly 3000 feet in height. Towards the coast it is in general of a dreary desolate appearance, with rugged bare rocks, chiefly of granite, and the old slates overlain in several parts by red sandstone. The largest river is the Hamilton River, which discharges into the Atlantic at Hamilton Inlet. Occasionally well-wooded spots are met with along the river courses. The table-land in the interior is very sterile; cariboo moss covers the rocks, and stunted spruce, birch, and aspen grow in the ravines. It is strewn with immense numbers of boulders, which are often curiously perched on the summits of the hills. The climate is less foggy than in Newfoundland, but very severe, the temperature in winter being about 30° below zero; and in the summer it does not rise above 85° Fahr.

The whale, seal, cod, salmon, and herring fisheries, off Labrador, employ during the season a constantly increasing number of fishermen and vessels. Much of the produce is sent to Newfoundland before being exported to Europe.

The European settlements on the east coast consist of Forteau and Bradore bays, Anse, Le Blanc, and the Moravian mission stations of Nain, Okhak, Hopedale, and Hebron. The mean annual temperature of Nain, the oldest settle-

ment, although in about the same latitude as Edinburgh, is 4° Fahr., or 28° below freezing point. The Hudson Bay Company formed several settlements on the west coast of East Main.

LABRADORITE is one of the plagioclastic feldspars. Its crystallites in the triclinic system; but well-formed crystals are of rare occurrence. In chemical composition it is essentially a silicate of lime, soda, and alumina; it gives the lime reactions, and is distinguished from *anorthite* by its being less soluble in hydrochloric acid, but more easily fusible before the blowpipe. One of the most remarkable characteristics of labradorite is the fine play of colours often seen on the brachypinacoid sections. On this account it is sometimes polished and used in jewelry.

Labradorite is an essential constituent of many basic igneous or eruptive rocks—such as *dolerite*, *basalt*, *hyphretholite*, and *diabase*. It also occurs in some metamorphic rocks, and is remarkably abundant in some of the Archean rocks of North America; it has obtained its specific name from its prevalence in huge masses of these rocks in Labrador.

LA BRIDÈ. See WRASSI.

LABRUYÈRE. See BRUYÈRE, JEAN DE LA.

LABUAN, one of the islands of the Malayan Archipelago, situated about 10 miles to the north-west of Borneo. It is a British possession, purchased in 1847 as a centre of British trade and influence in the route between India and China. It is only 10 miles long and 5 wide, but it was expected to be valuable, both on account of its position and also because it contains some extensive mines of admirable coal, but the latter have not, so far, been worked successfully, and Labuan is now simply a collecting station for the sago and nage produce of a portion of North-west Borneo and the adjacent islands, which it forwards to Singapore. The public roads and even the coaling wharf have been allowed to fall somewhat into decay. The climate is fairly healthy, but as the land has been allowed to be denuded of its timber and other forests, the soil has become terribly impoverished. The population in 1885 was only about 6000, and has been largely reduced by the ravages of small-pox since 1874. The seat of government is at Victoria, which has a good harbour. The distance from Labuan to Singapore is 707 miles.

LABURNUM is a genus of plants of which the common species, *Laburnum vulgare*, is well known. The genus has been separated from *Cytisus* by Benth and Hooker, chiefly on account of their seeds. There are three species, natives of Europe and Asia Minor. The lip of the calyx is very short, the claws of the petals are free, and the pod is stalked. *Laburnum alpinum* is the Scotch Laburnum. Both kinds are natives of the Alps of Europe, and are well known in gardens for the beauty of their pendulous racemes of beautiful yellow flowers. They have a handsome, hard, olive-green wood, well adapted for the purposes of the turner. The Scotch laburnum has the broader and more shining leaves of the two, and is much the handsomer plant. It is not a little singular that the seeds of these species, in an order of plants usually whole some, are decidedly and dangerously poisonous, owing to the presence of the deleterious alkaline principle called cytisine. The *Cytisus* of Virgil was the *Medicago arborea* of botanists.

LABYRINTH (Gr. *labirinthos*), a place involved in confusion and almost inextricable sinuities—a species of intricate puzzle, feebly imitated in the "mazes" of the last century, such as the Maze at Hampton Court. In ancient history and mythology four famous labyrinths are described: one in Crete, which Daidalos built, at the instigation of Minos, to imprison the Minotaur; one in the island of Meroë, devised by the Egyptian Pharaoh Psammetik, and composed of twelve palaces, all communicating with one another, and so divided into rooms and corridors that the person once astray

within its walls could not hope to discover an egress without a guide. The use of this magnificent edifice, which stood close to Lake Moeris, was to afford accommodation to the numerous deputations from the municipalities of ancient Egypt when they came up to the yearly assembly. A third labyrinth existed, it is said, at Lemnos; and a fourth was built by Porsema, king of Etruria. The fabled use of the labyrinth made at Woodstock by Henry II. to conceal his mistress, Fair Rosamund, is one of those fascinating historical myths whose disappearance makes us occasionally receive the cold light of truth with displeasure. For the *labyrinth* of the ear see EAR.

LABYRINTHODON is a genus of extinct amphibians belonging to the order LABYRINTHODONTA. It is known mainly by footprints in the New Red Sandstone, and by discoveries of its skull. The body was probably of colossal size, resembling in shape that of a salamander.

LABYRINTHODONTA is an extinct order of AMPHIBIA. The labyrinthodonts were colossal animals, resembling for the most part the existing salamanders in shape. They lived from the Carboniferous to the Triassic age, being most abundant in strata of the latter period. Before any remains of these amphibians had been discovered, remarkable footprints were found in the New Red Sandstone. These footprints so much resembled in shape the human hand that the unknown animal which had produced them was named *Cheirotherium*, that is, Hand-beast. The nature of *Cheirotherium* was for some time doubtful, Kaup, one of the early discoverers of the hand-like impressions, considering it to be a mammal. In the light of further discoveries these footprints have been referred to several species of amphibians; and they and their allies now constitute the order Labyrinthodonta, the name having reference to the labyrinthine pattern seen in a transverse section of the teeth.

The Labyrinthodonta resembled the salamanders (*Urodela*) in some respects, the frogs (*Batrachia*) in others. The body was salamander-like, with relatively weak limbs and a long tail. Some, however, as *Ophiderpeton*, were serpent-like, and apparently had no feet. The chest was protected by three bony plates, and the belly by an armour of small oval scales. The head, defended by hard bony plates, was of great size, the skull of one species being upwards of 3 feet long and 2 feet broad. Teeth were present in the jaws as well as on the vomers and palatine bones; they are of various sizes, all more or less indented by convoluted folds giving rise to the labyrinthine pattern. The vertebrae were biomegaly, like those of fishes. The extremities of the limbs were provided with five toes. It is probable that the Labyrinthodonta were *caduchbranchiate*, that is, the gills did not persist after lungs were acquired. Traces of branchial arches are only found in young specimens of *Archegosaurus*, a genus from the coal measures. Numerous genera are included in this order. *Archegosaurus*, *Ophiderpeton*, *Pholidogaster*, *Dendropteron* are among the well-known genera of the Carboniferous age, some of which were of comparatively small size. Labyrinthodon is the most important Triassic genus.

LAC or **LAKH**, of Rupees (Indian), is not a coin but a sum, namely, Rs 100,000. When the rupee is worth 2s. the lac is therefore worth £10,000; but of late years, owing to the fall in silver, this value has been diminished in proportion. A *crore* is 100 lacs. The notation of rupees is therefore peculiar. Up to 100,000 the usual pointing is followed; then it alters. Thus Rs 5,66,15,625 would be read 5 crores, 66 lacs, 15,625 rupees.

LACCADIVE ISLANDS are situated in the Indian Ocean, about 100 miles from the coast of Malabar, between 10° and 13° N. lat., and 72° and 75° E. lon. They are nineteen in number, but only eight are inhabited. They consist chiefly of low coral formations, and are surrounded with deep water. The largest of these islands, Anderot, is

only 3 miles in length and a mile broad. The principal products are coir, jaggery, cocoa and betel nuts, with some rice, sweet potatoes, and small cattle. The inhabitants are Mohammedans in religion, and are chiefly a gentle inoffensive race. They number about 14,000. Since 1877 the whole group has been under the government of the Indian administration. The islands are unfused, but their principal product, coir, is purchased by government at rates fixed by itself.

LACCOLITES, lenticular bosses or masses of igneous rock that occur in the stratified deposits of some districts, and to which the strata both above and below are conformable. They are evidently the effects of smothered volcanic action, the masses of rock having been injected from below when the strata were in a horizontal position, but the volcanic force was not sufficient to rupture the superincumbent beds and eject the molten rock on the surface.

LACE. This delicate textile fabric, which is deservedly so highly prized for its ornamental qualities, differs essentially in form and appearance from the products of the loom, and seems to be a development of the earlier work known as embroidery. It was introduced first into Europe by the Greeks, and from them, about the end of the fifteenth century, its manufacture passed to the Venetians. The latter soon improved the earlier patterns, and developed the manufacture until it attained a high degree of excellence. From Venice the art of lace-making passed to other parts of Europe, and was especially developed in Flanders, though it was also successfully introduced into France and England. Lace-making came in for a share of the attention of the great French minister, Colbert, and during the reign of Louis XIV. the royal aid and patronage bestowed upon this industry enabled the French lace-makers to produce some very beautiful work. Lace as a dress ornament is now used mainly for the clothing of ladies and young children, and for the robes of ecclesiastics; but during the sixteenth, seventeenth, and eighteenth centuries it was freely used in male attire. Four kinds of lace are recognized—(1) that made wholly by the needle, hence called "needle-point" lace; (2) that made by means of a series of pins and bobbins and a pillow or cushion, called "pillow" lace; (3) a kind of lace made by a combination of the former methods; (4) machine-made lace. Up to the commencement of the present century all lace was made by hand, and the finest and most costly kinds are still made in this way. The true point lace is made with a needle on a piece of green parchment, upon which the pattern has been printed or traced. The main lines of the pattern are formed of threads laid over this tracing and attached to the parchment by a few stitches. The needle is then employed to cover and connect these threads, so as to complete the pattern. For pillow lace the implements used consist of a pillow or cushion, a series of bobbins, round which the thread or silk employed is wound, and pins, which are stuck into the cushion, and around which the threads are twisted, the pattern being determined by the disposition of the pins, and this again being regulated by holes pierced in a piece of parchment, which is laid upon the cushion. It is not possible, however, to give in writing an intelligible description of the hand-lace manufacture, nor indeed of that in which machinery is employed.

The principal seat of the hand-made lace trade in England is Buckinghamshire. Small quantities are made in the West of England, especially at Honiton in Devonshire. There are also a large number of females employed in the trade in the north of Ireland; but the most esteemed qualities are imported from foreign countries—especially Belgium and France—and are generally known by the name of the town in which they are made. Hand-made lace is still largely used upon the Continent, and wedding orders are sometimes received at Alençon for £6000 worth at a time. Every piece of Alençon point passes through the hands of twelve

workwomen. The demands made upon human ingenuity and patience in the fabrication of the best qualities of lace are most excessive. For "Valenciennes," made at Ypres, £80 per metre is paid; but sometimes 1200 bobbins are required for one pillow, and it takes an expert lace-maker three weeks' work, at the rate of twelve hours a day, to make one inch. For these extremely fine kinds a wonderfully slender thread is required, and the best Brussels thread is spun in cells underground, because the dry air above would cause it to snap. Upon the worker, as she sits in the dark, is directed one ray of light, but the thread is so fine that her delicate fingers are better guides than her eyes. Very many soon lose their sight, and the high pay the lace-maker earns is proportionate to the acknowledged unhealthiness of the occupation. The homespun thread made at Brussels of flax of Brabant costs, before it is made up to lace, £210 per pound, and the process of manufacture more than doubles the value. Fine cotton yarn, however, is sometimes substituted for flax and silk; gold and silver threads, mohair, and also fibre are also employed. Of late years lace-making as formerly conducted has very much declined in this country owing to the greater cheapness of machine-made lace.

Machine-made Lace.—Numerous attempts to make lace by machinery were made towards the close of the last century, and one machine which made bobbin-net was designed and worked soon after 1768 by John Hammond, a clever workman of Nottingham. In the years 1808–9 John Heathcoat, of Nottingham, obtained patents for some important machines for lace making, and these were afterwards greatly improved by Levers, Thompson, and Landley, the latter of whom for the first time applied steam-power to lace machines in 1816. They met with much opposition at the outset from the hand-lace makers, but ultimately their use prevailed, and they have now attained to a high pitch of perfection. By the application of the Jacquard apparatus to the lace-making machinery all sorts of patterns can be produced, and in 1881 a machine was introduced in France for which it was claimed that it could accomplish nearly everything that had been done by hand. In the machines used there are to be seen the accumulated results of several generations of ingenious experimenters, and they are justly regarded as triumphs of mechanical skill. One writer speaks of them as bearing the same relation to an ordinary loom that a watch does to a wheelbarrow, while another says they are as much beyond the most curious chronometer in multiplicity of mechanical device as that is beyond a common roasting jack.

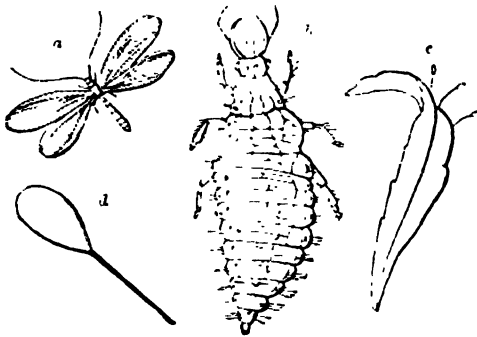
Nottingham and the neighbourhood is the principal seat of the lace trade in this country, and the vast dimensions and importance of this highly skilled manufacture may be estimated from the following figures in 1884:—The annual exports of cotton lace goods was over £2,500,000, and of silk laces, £300,000, this being only a part of the great quantities made; it is considered that the materials worked up cost about £2,000,000 annually, and the wages and profits are computed at £1,000,000. Finishing laces are made of different widths and qualities, and the prices range from a halfpenny to one pound per yard, while curtains vary from a few shillings to many pounds per set. Great progress has been made of late years in the imitation of hand made lace. White and black are the usual colours for lace goods, but one novel feature of the present time is the introduction of fancy coloured laces, some being made from coloured threads, while other kinds are dyed in the piece. A kind of lace called *Swiss embroidery* has been introduced from Switzerland, to the great detriment of the Nottingham made goods, but machines have recently been imported and the lace can now be made here. Those fine, soft, long-armed gloves which ladies wear are made from "taffeta" worked on a warp machine, but more like hosiery than lace. Adaptation, improvement, and altera-

tion go on from year to year, and the utmost ingenuity of machinist, designer, and maker is ever on the strain to keep pace with the changes of fashion and the demands of trade. Silk and cotton are the materials used in lace-making, and the trade is remarkable for the employment given to women and girls both in warehouses and in their own homes, the wages earned when trade is good being very high. Large quantities of lace goods are made on the Continent also, and some machines are now at work in America.

(See "History of Lace," by Mrs. Bury Palliser, 1869; latest edition, 1875; "La Dentelle," by M. J. Seguin, 4to. Paris, 1875; and "Ancient Needle-point and Pillow Lace," with photographs: Alan S. Cole, London, 1875.)

LACE-BARK TREE (*Lagetta linearia*) of Jamaica, is most remarkable for the tenacity of the fibre of which its bark consists, and for the facility with which it may first be separated into thin layers and then into distinct meshes. If the inner bark of this plant be macerated in water, it may be readily separated into layers no thicker than the finest lace, and which, after having been pulled a little sideways, resemble in some measure that fabric. King Charles II. is said to have had a cravat, frill, and ruffles of lace-bark presented to him by his governor of Jamaica. This tree belongs to the order *Thymelæaceæ*.

LACE-WING and **LACE-FLY** are names given to insects of the family Hemerobiidae, which belongs to the order Neuroptera, from their delicate gauze-like wings, traversed by a fine network of veins. In the Hemerobiidae the body is soft and slender, the antennæ long and thread-like, and the eyes large, prominent, and vividly metallic, of



a. Perfect insect.
b. Larva magnified.
c. Antler on egg stalk, magnified.
d. Egg magnified.

a gold or ruby lustre. The wings are very large. In the genus *Nemoptera* the hind wings form a very long narrow strap, widening slightly towards the extremity, while the front wings are broader than in the other genera. When hatched the perfect insect emits a most disagreeable odour. The eggs are connected with the leaf upon which they are laid by a long slender stalk, formed by a secretion from a peculiar gland. When ready to deposit an egg the female applies the extremity of her abdomen to the surface of the leaf, then elevating her abdomen draws out the secretion into a slender thread, about half an inch long, and places a little oval egg at its summit (c d in cut.) The larva (b) emerges from the egg in less than a week. When first hatched, according to Dr. Fitch, these larvæ feed chiefly on the eggs of insects. When increased in size they devote themselves to the destruction of the aphides or plant-lice. Their jaws are powerful, long, and sickle-shaped. In some species they cover themselves with the empty skins of their victims, which are supported on their backs by the radiating bristles which clothe them. When the larva has attained

its full growth it becomes inactive and spins a cocoon, the tail exuding a glutinous secretion which hardens on exposure to the air.

The cocoon is attached to a leaf. The pupa is inactive, and speedily attains the perfect condition, so that several broods appear in the summer. The perfect insect is usually seen on the wing in this country in the evening; the powers of flight are feeble. It is a vegetable-feeder.

The Lace-wings range from Europe to Australia. Several species of the typical genus, *Hemerobius*, are common in the British Isles. Another common British genus is *Chrysopa*, containing the Golden-eyes, in which the wings are pale green and the eyes golden. Another British species is *Osmylus chrysopa*, a pretty, brown insect, with the wings spotted with black; it is met with in the month of June, and appears to prefer stony rapid streams which are fringed with alders. The larva lives partly in water; the cocoon is of irregular form, and composed of spun silk. In the genus *Sisyra* the larva is aquatic.

LACEDÆMON. See SPARTAN.

LACERTIDÆ is a family of LIZARDS (*Lacertilia*) containing the common English and European species of that order. In this family the body is stout and the limbs are well developed. The Lacertidæ are distinguished by having a pyramidal head, covered with regular many-sided shields; a scaly throat, often with a cross fold in front, and a collar of larger scales behind; a lengthened, flat tongue, not sheathed, but free at the base, divided at the tip into two long forks, and capable of being projected to a considerable length. Their teeth are hollow at the roots internally. They are all natives of the Old World and Australia, and are all terrestrial.

The Sand Lizard (*Lacerta agilis*) is a native of this country. It has a short thick body and short stout legs; the tail is rather thick and swollen at its root. The usual length of this lizard is about 7 or 8 inches, of which the tail measures 4. In colours individuals vary very much; in general, however, the tint of the upper parts is sandy-brown, with obscure longitudinal marks of a darker brown, and a series of black rounded spots down the sides, each spot marked with a white or yellowish dot in the centre. The sides are often tinged with green. It is a northern species, rarely occurring so far south as Italy, but not uncommon in the northern parts of France and the middle districts of the European continent; it is not very abundant in this country, but extends as far north as Sweden and Denmark. Mr. Bell, in his work on the "British Reptiles," informs us that the sand lizard is common in the neighbourhood of Poole in Dorsetshire, its general abode being on sandy heaths, "where it is frequently seen crossing the small by-paths with considerable swiftness." It is also occasionally seen on the sunny sides of green banks, basking in the sun's rays, and retreating quickly on the approach of any intruder. It is very quick in its movements. If seized it will bite, but its bite is very insignificant. It is impatient of captivity and soon pines to death. The female lays her eggs, to the number of twelve or fourteen, in hollows in the sand, which she excavates for the purpose, and having covered them carefully with sand, she leaves them to be hatched by the heat of the sun.

The Green Lizard (*Lacerta viridis*) is a common species in the south of Europe, and is also found in Guernsey. It attains a length of about 15 inches. It is easily tamed, and is often kept in cages. The Ocellate Lizard (*Lacerta ocellata*) is found in the countries fringing the Mediterranean both in Europe and Africa. It is a large species, its usual length being 16 inches, but it sometimes reaches 2 feet and upwards. It is a bold creature, and will bite severely. The Wall Lizard (*Lacerta muralis*) is the commonest lizard in France. It is a lively little lizard, 5 or 6 inches long, frequenting the walls of gardens, on which it climbs with great agility.

The Viviparous Lizard (*Zootoca vivipara*) is the commonest of the three English lizards. It is much smaller and more graceful in its movements than the sand lizard. The head is more depressed, the feet are more slender, and the body is more slim in general form. It differs from the lizards of the genus *Lacerta* in having no teeth on the palate. It is usually from 5 to 6 or 6½ inches long, and though it varies much in markings, its ordinary colour is greenish or olive-brown, with a dark brown line down the middle of the back, which is often somewhat interrupted. A broad band extends parallel with this on each side, and in the intervals between these are often one or more rows of black dots. In the male, the under part of the body and base of the tail are bright orange spotted with black; in the female, pale grayish-green without spots. It is a pretty, active, gentle little creature, and is chiefly found in dry, sunny banks, thickets, and copses. In England it is very common, much more so than the sand lizard, and is also met with in Ireland. On the Continent it is not so abundant, but it exists in France, Italy, Germany, and Switzerland. Its movements are singularly rapid and sudden. Its food consists of insects. The female of this lizard retains her eggs within her body until the young are ready to leave them, and thus they are produced alive. These young when brought forth are fully formed, and capable of running about, and very shortly afterwards of taking their own food. Their ordinary number is four or five. They are often seen in company with their mother, who probably has some maternal instincts.

The Lacertidae are fairly numerous, about fifty species having been described. In some genera the toes are flattened, keeled beneath, and toothed or fringed on the sides. Species of the genera *Acanthodactylus* and *Eumeces* are common in South Africa.

LACERTILIA is an order of REPTILES comprising the animals known as LIZARDS. The Lacertilia have an elongated slender body, either folded into scales or granular: two pair of limbs are typically present, but one pair is sometimes absent; sometimes the limbs are reduced to mere rudiments of the scapula and pelvis, which are hidden beneath the skin. The quadrate bone is not immovably united to the skull, as in crocodiles. The teeth are not lodged in distinct sockets. Movable eyelids are generally present. The mouth is not dilatable. See LIZARD.

LACH'ESIS, one of the *Moirai* or Fates in the classical mythology. The office of Lachesis was to spin the thread of life for each man, which Atropos was at the appointed hour to cut.

"Then comes the Fury with th' abhorred shears
And slits the thin-spun life."

LACH'ESIS is a genus of venomous serpents belonging to the family Crotalidae, which also contains the RATTLESNAKE (*Crotalus*). The best known species of this genus is the Bushmaster (*Lachesis mutus*), which is one of the most formidable reptiles of Guiana and Brazil. It presents a great resemblance to the true rattlesnakes, and has a rudimentary rattle at the end of the tail. It grows to a length of 6 or 7 feet. It inhabits dark sombre forests, lurking under leaves, &c.; and preys on small mammals, birds, and some kinds of reptiles.

LACH'RYMAL ORGANS, DISEASES OF THE. A description of these organs and the part they take in connection with the power of sight has already been given in this work under EYE. They are liable to certain affections, however, which also require notice, and will be described in this place.

The first of these, from its frequency and importance, is that known as *Epiphora*, or the excessive secretion of tears, which may arise from a variety of causes. It is well known that any accidental irritation of the eye is apt to be followed by a copious secretion of tears, and a similar

result attends inflammation of the eye or eyelids. It sometimes arises from displacement, obliteration, or occlusion of the puncta, so that the superabundant moisture of the conjunctival surface, instead of being removed in the ordinary way, fills up the eyelid and flows down over the cheek. The commonest cause, however, is the obstruction of the nasal duct caused by a thickening of its lining of mucous membrane. The first symptoms of this are weakness and watering of the eye when it is exposed to the wind or exercised in reading, followed by a swelling in the inner corner of the eye arising from distension of the lachrymal sac in which the tears have collected. When pressure is made upon this by the finger the fluid collected, which consists of tears more or less mingled with mucus, is either pressed through the nasal duct into the nose, or it is pushed out into the eye and the lump disappears. Sometimes the affection remains in this stage for a long period, but it often leads to inflammation of the sac and the formation of a fistulous opening upon the cheek, producing what is called a *lachrymal fistula*. This opening is very difficult to heal, and while it remains the patient is distressed by frequent returns of inflammation and suppuration of the sac.

In all cases of an over-secretion of tears the attention, in the first instance, must be directed to the conditions which are likely to have brought it about. Sometimes minute foreign bodies which have entered the eye, such as grains of sand, the wing-cases of minute insects, &c., become embedded in the eyelids, and by the irritation they cause they give rise to this affection. When these are detected and removed the troublesome symptoms quickly disappear. Where weakness is the cause, as in the case of scrofulous children, mild aperients and tonics are required, with the use of mild astringent local applications. When the distension of the lachrymal sac is unattended with inflammation it may be sufficient for the patient to empty it by pressure whenever it becomes dilated, carefully wiping away the fluid, and using afterwards a drop or two of a mild astringent lotion to allay any irritation of the conjunctiva. Where there is inflammation and suppuration a slight surgical operation becomes necessary. The closed nasal duct is opened by puncture, and a style is introduced to keep this channel open. The style consists of a nail-headed bar of silver about 1½ inch long and one-twentieth inch thick. The head is plano-convex in shape, and the neck forms an angle of 130 degrees to the body. When this is kept in the nose the tears flow into the nostril along its sides, the flat head of the instrument keeping it in its place and allowing it to be readily removed for cleansing purposes. In practice it is usual to cover the head of the style as it lies on the cheek with a small piece of court plaster, so as to prevent notice.

Sometimes there exists an unnatural dryness of the eye, owing to the suppression or imperfect secretion of tears, to which the name of *Xerophthalmia* or *Ophthalmia tarsi* has been given. It is not very common except as a symptom of more serious affections, but when it occurs palliative treatment, such as keeping the cornea moist with glycerine, is sometimes useful.

The lachrymal organs are also liable to become the seat of fibro-plastic tumours, scirrhus, and medullary fungus, and calculi are occasionally formed in the ducts. For the treatment of these and other important affections, see Dr Macnamara's "Manual of the Diseases of the Eye" (London, 1876).

LACH'RYMATORY (Lat. *lachryma*, a tear), a small glass phial, or globular earthen vessel, with a long neck, frequently found in the ancient Roman sepulchres. In these vessels it is supposed the tears of the friends of the deceased were dropped, and preserved with the ashes contained in the funeral urn. They are often found in our museums and in the cabinets of the curious.

LACISTEMA'CEÆ, a small and obscure order of plants, containing a few arborescent species, inhabiting the woods of tropical America, in low places. The order belongs to the *MOXOCULAMYDEÆ*. The flowers are unisexual or hermaphrodite in axillary catkins. The perianth is free; there is one hypogynous stamen; the ovary is one-celled, with two or three parietal placentas. There are sometimes two or three albuminous seeds, but generally only one.

LACO'NICA (properly *Lakonika*), called by the Roman writers *Laconia*, and *Lacedæmon* by Homer, a country of ancient Greece, was bounded on the west by Messenia, on the north by Arcadia and Argolis, and was surrounded by the sea on the east and south. Laconia is a long narrow valley, running from north to south, between two mountain masses, which stretch from Arcadia to the southern extremity of the Peloponnesus: the western range, which terminated in the promontory of Tanarum, now Matapan (36° 23' N. lat.), the most southerly point of Greece, was called Taygetus; and the eastern, terminating in Cape Malea, was known by the names of Parnon, Thomax, and Zarex. Between the mountains which form the eastern boundary of the valley of the Eurotas and the sea there was a narrow strip of land, which contained the towns of Delium, Mineæ, and Epidaurus Limera, belonging to Laconia. The area of Laconia was probably about 1896 square miles. The district of Thyreatis, on the borders of Argolis, was conquered by the Spartans about 547 B.C.

There were no large towns in Laconia except SPARTA. One of the most ancient towns was Amyclæ, the residence of the Achaean kings, situated a little to the south of Sparta, in a fertile plain.

The Leleges, according to the most ancient traditions of Laconia, were the earliest inhabitants. At the time of the Trojan war Laconia was in possession of the Achæans, who settled in it at a very early period, and probably conquered the Leleges. During the reign of Tisamenus the Peloponnesus was invaded by the Dorians, and the country fell to the share of Aristodemus or his sons Eurysthenes and Procles. The condition of the original inhabitants of the land, and their relation to their Dorian rulers, belong to the history of Sparta. It is from this country that our word *laconic* is derived, arising from the brevity and sententiousness which the Spartans are reputed to have affected in their speech.

LACORDAIRE, JEAN BAPTISTE HENRI, a distinguished French preacher, was born at Reçey-sur-Orne, Côte-d'Or, 12th March, 1802. In 1821 he went to Paris, and commenced pleading at the French bar with considerable success; but in 1823 he abandoned his profession and became a theological student at the seminary of St. Sulpice. In 1827 he was ordained priest, and in 1830 he joined Lammenais and Montalibert in the editorship of the journal *L'Avenir*, in which the union of democracy in politics and ultramontaniam in religion was earnestly advocated. In 1832 the papal authorities condemned the *Avenir*, and the editors went to Rome, and endeavoured unsuccessfully to convince the Pope of the usefulness of their propaganda. In 1834 Lacordaire commenced a series of lectures at the College Stanislas, which attracted great attention, and the following year the Archbishop of Paris opened to him the pulpit of Notre Dame. Here Lacordaire found his true vocation and achieved his greatest triumphs. He had passed through scepticism, was familiar with history, philosophy, literature, and social and political life, and while he possessed all the resources of oratory, he used his powers in obedience to an earnest and passionate conviction of the truths he proclaimed. Whenever he preached the cathedral was crowded. After two years Lacordaire again surprised his friends by becoming a Dominican friar. After the revolution of 1848

he was returned as a deputy to the Assembly, but soon abandoned politics for his ecclesiastical work. In 1850 he went to Rome and was made provincial of his order. In 1851, finding his health failing, he retired to Sorèze to become director of a private lyceum, and died 22nd November, 1861. An edition of his complete works was published in six vols. in 1858, but the best edition is that which was issued in nine vols. in 1872. (See also "Henri Lacordaire," a biographical sketch by H. L. S. Lear, London, 1882.)

LACQUERING. See JAPANING.

LACROSSE, the national ball game of British North America, where it occupies a position something like that of base-ball in the United States, and cricket in England. It was originally played in a rough and violent fashion by the Indians before the arrival of white settlers, and they still retain their interest in the game, in which they are very skilful players. The name *lacrosse* was given by the French settlers on account of the resemblance of the chief implement used in the game to a bishop's crozier or *crosse*. The game requires a large space of ground to play it properly, not less as a rule than about 400 yards square, and the ground should be tolerably level. Towards the ends of the ground, goals composed of two flag posts, about 6 feet high and 7 feet apart, are placed, and the players are stationed somewhat as in football. A full team consists of twelve players on each side, and each player is paired with an opponent and provided with a *crosse*, a light hickory stick about 4 feet long, curved at one end and having across the curve and half way down the stem a strong net stretched. The net is sufficiently loose to hold the ball, but it must not bag. The game is commenced midway between the two goals, the ball, which is made of hollow india-rubber, and is from 8 to 9 inches in circumference, being placed upon the ground and struck off or faced by the captain of one side, the right of thus starting the game being decided by lot. Each side endeavours to drive the ball through its opponent's goal, and a game is finished every time a goal is scored. The ball during play must not be touched by the hand or foot, but is to be struck, carried, or thrown only by means of the *crosse*. The players are not allowed to hold each other, nor to grasp an opponent's *crosse*, but when a player has caught and is carrying the ball upon his *crosse* it is allowed to any of the opposite side to strike the ball from it with their own weapon. The chief aim of each player is to get the ball upon his *crosse*, to dodge the opposing players, and to run as near the goal as practicable, and either throw it through or to one of his own side stationed nearer. The game affords ample opportunities for the development of fleetness of foot, quickness of eye, skill, and presence of mind, while it is destitute of the dangerous elements of football or hockey. In Canada the game is popular all the year round, and during the winter it is played as an ice-pastime by skaters, or upon the snow by the aid of snow-shoes. It was introduced into England by a team of Indians in 1867, and an English association was formed the following year. It is still occasionally played, but does not seem likely to supersede either of the old established ball games of this country.

LACTATION (Lat. *lac*, *lactis*, milk), the secretion of MILK in the breast-glands of the females of mammals.

LACTEALS (from *lac*, milk) are so called from their containing during digestion an opaque, white, milky fluid. They are the system of vessels by which the chyle, or nutritive part of the food, is conveyed from the intestines to the left subclavian vein, in which it is mixed with the blood. They have their origin in the villi of the small intestines, which are short hair-like processes, each consisting of a fine network of lacteal vessels, surrounded by capillary arteries and veins. There is no essential difference between lacteals and lymphatics. See LYMPHATICS.

LACTIC ACID is the acid contained in sour milk. It is also found in flesh, and is then called *sarcrolactic acid*. It is present too in many fermented vegetable juices, and gives much of the acidity to old ale and beer. It is usually obtained in the fermentation of cane sugar in the presence of chalk, by sour cheese, which induces the lactic acid fermentation. Lactic acid is a syrupy acid liquid, colourless and inodorous. It is soluble in water and alcohol. The specific gravity is 1.215, and the formula $C_3H_5O_3$. It forms a large series of salts known as lactates, which are generally crystalline and soluble; some are used in medicine, as the lactates of iron and zinc. It forms several conjugated acids, as aceto-lactic ($C_5H_7O_4$), benzo-lactic ($C_{10}H_{10}O_4$), and sulpho-lactic ($C_3H_5O_3S$), and some others. All of these form salts with bases.

Lactic ether ($C_3H_5O_3$) is a colourless liquid, of specific gravity 1.042, boiling at $156^\circ C.$ ($313^\circ F.$), and soluble in water, alcohol, and ether. Lactic anhydride or lactide ($C_3H_4O_2$) crystallizes in rhombic colourless plates, melting at $107^\circ C.$ ($225^\circ F.$), and boiling at $250^\circ C.$ ($482^\circ F.$). Water converts it into lactic acid. Ammonia converts it into lactamide ($C_3H_7NO_2$).

LACTIN or LACTOSE is the sugar of milk. It is isomeric with cane sugar, and is fermentable. It is obtained by the evaporation of whey in hard trimetric prismatic crystals. The formula is $C_{12}H_{22}O_{11}$, and the specific gravity 1.525. It is soluble in water and alcohol. It is largely manufactured in Switzerland, and imported from thence for use in making the globules used in homoeopathic medicine. In the fermented form it is used as a strengthening beverage, under the name of *Koumiss*.

LACTOMETER (Lat. *lac* and *metrum*), an instrument for ascertaining the different qualities of milk. Several sorts have been invented, one consisting of a glass tube a foot long with a funnel at the top. The upper two inches of the tube are marked in small divisions; and when the instrument is filled with milk to the height of one foot, the depth of cream it yields is noted by the gradations on the upper part. In another class the instrument is floated in the milk, and the calculation is made according to the depth to which it sinks in the fluid.

LACTUCA, a genus of plants belonging to the order **COMPOSITEÆ**. *Lactuca virosa* (acid lettuce) is found on hedges, old walls, and the skirts of fields throughout Europe. It yields a milky juice, which contains lactucic acid. [See *LITTELL*.] *Lactuca scariola* (prickly lettuce) is not so acid as *Lactuca virosa*, but possesses the same properties.

LACTUCARIUM, a substance obtained by evaporating the juice of the acid lettuce (*Lactuca virosa*), natural order **COMPOSITEÆ**. The juice is obtained by incision of the stem, and when inspissated resembles opium in appearance and properties. It is used in medicine as a narcotic. The active principle is lactucin, a yellow, crystalline, bitter substance soluble in water and alcohol, and having the formula $C_{26}H_{38}O_8$. It also contains lactucic acid ($C_{10}H_{16}O_4$) and lactucosone ($C_{10}H_{16}O_3$). Lactucin is also found in the ordinary garden lettuce (*Lactuca sativa*), which has therefore mild sedative properties.

LACUSTRINE DEPOSITS, in geology, are those series of strata that have evidently accumulated in confined fresh-water areas. These deposits occur on many horizons throughout the geological record; they are in some respects not unlike estuarine deposits, but have some essentially distinctive characteristics. The contained fossils are generally of fresh-water types and often much dwarfed; remains of terrestrial plants and animals are often found. Marine or brackish water deposits seldom occur, and although the old lakes were sometimes subjected to incursions of the sea, the consequent deposit is confined to the one horizon, and does not show a tendency to increase in one particular direction, as is the case with

estuarine deposits. Lacustrine deposits usually vary greatly in character over limited areas; they vary both in the nature of the material and in its coarseness. Gravely and conglomeritic accumulations usually occur towards the margin of the basin, while the deposit becomes gradually finer towards the centre. Chemical deposits may also occur; rock-salt, gypsum, and some dolomites are ascribable to this class of deposit, but in saline lakes. The shell marl of Scotland is a lacustrine deposit of organic origin, as is also the Tripoli polishing stone, which is composed of the silicious skeletons of Diatoms. The lake iron ores of Sweden are modern lacustrine deposits. The Antrim iron ores, which have been correlated with the leaf-beds of Ballypaddy and Mull, are considered to have been similarly formed, although they are crystallized red hematite, unlike the lake ores, which are limonite. Other lacustrine deposits that may be mentioned are the fresh water deposits of **AUVERGNE** and the molasse of Switzerland, which, however, contains marine beds indicating incursions of the sea.

LADAKH, or MIDDLE TIBET, is a kingdom in Asia, situated north of the Punjab, and south of Chinese Tartary, and subject to the ruler of Cashmere. It lies between $32^\circ 20'$ and $35^\circ N.$ lat., and $75^\circ 30'$ and $79^\circ 30'$ E. lon. The north frontier is formed by the great chain of the Kuen Lun or Karakorum Mountains, which send down several stupendous branches to the south, and the whole country is composed of a number of narrow mountain valleys, traversed by rapid rivers, and walled in by very lofty mountains—branches of the Kuen Lun and the Himalayas. The highest peaks are from 20,000 to 24,000 feet high, and are covered with perpetual snow, while no part of the whole country is below 10,000 feet, and few parts below 15,000 feet. It is part of the central plateau of Asia. Through the middle of the country runs the valley of the river Indus, which passes the towns of Roodok and Leh, and receives the waters of the Shayuk and other tributaries. There are several lakes, most of which are salt, and furnish great quantities of that article.

The soil is sterile, and the climate severe and extreme. The direct rays of the sun are very powerful. In September, at an elevation of 10,000 feet, the thermometer at mid-day, resting on the rocks, reached 158° ; at 14,500 feet, on the sand, it gave 130° ; and at a tent, pitched at a height of 13,000 feet, it reached $110^\circ F.$ The line of perpetual snow averages the great height of 19,000 feet above the sea-level. This phenomenon is attributed to the rarefaction and tenuity of the atmosphere, from elevation, and absence of moisture. From December to February the thermometer ranges from 10° to $20^\circ F.$; yet the mountain sides being carefully embanked with stone dykes, and industriously cultivated, pretty good crops of wheat, barley, buckwheat, apples, and apricots are grown. Prangos, a peculiar kind of fodder, is abundant. The minerals comprise sulphur, iron, lead, copper, and gold, which abounds in the beds of the rivers, but is prohibited by the government from being collected. The transit trade with all the neighbouring regions is extensive, and conducted mostly by means of mules and sheep.

The inhabitants of Ladakh belong to the same race as the inhabitants of Tibet. They are stated to number altogether about 125,000, and are good farmers, peaceable, honest, and hospitable. Lamaism is the prevailing religion. See **LAMAISM**.

Ladakh has a considerable commerce with surrounding countries, the chief article of which is the wool of the goats, which is used in the manufacture of Cashmere shawls.

Ladakh originally formed one of the provinces of the kingdom of Tibet; but when the Chinese conquered that country they did not extend their sway so far, and it seems to have retained its own princes. Towards the end of the

seventeenth century the Kalmuck Tartars invaded Ladakh, and the rajah fled to the governor of Cashmere, who, with the permission of Aurungzebe, reconquered the country for the rajah. From that time a small annual present was made to the Emperor of Delhi through the governor of Cashmere. At one time, fearing the approach of the Sikhs, Ladakh offered to submit to Great Britain, but the offer was refused, and in 1835 Gholab Singh, rajah of Cashmere, invaded and conquered the country, meeting with no resistance from the unwarlike natives. A small annual tribute, disguised as a present, is, however, sent to the Chinese authorities on behalf of the government.

LAD'ANUM. See LABDANUM.

LADIES OF THE QUEEN'S HOUSEHOLD.

These consist of the mistress of the robes, the ladies of the bedchamber, the bedchamber women, and the maids of honour. The mistress of the robes has superintendence of all the others and the custody of the robes. On state occasions she must see that the ceremony of robing the queen is properly performed. The ladies of the bedchamber and the bedchamber women, of each of whom there are eight, with several extra ladies, are personal attendants upon her Majesty. There are also eight maids of honour, who in rotation perform the duty of accompanying the queen on all occasions. They are styled "Honourable," even if not entitled to that distinction by birth. See BEDCHAMBER, LORDS AND LADIES OF THE.

LADOGA, LAKE, a lake of Russia in Europe, surrounded by the governments of St. Petersburg, Olonetz, and Wyborg in Finland. The Ladoga is the largest collection of fresh water in Europe. Its length, north-west to south-east, is about 125 miles; greatest breadth, about 70 miles. The area is about 7500 square miles. The depth is very unequal, but does not exceed 900 feet. The surface is 55 feet above that of the Gulf of Finland, with a rise and fall of about 7 feet, according to the state of the barometer. Owing to ice its waters are only navigable for about 180 days in the year. It receives about sixty rivers, the chief of which are the Wuoxen, connecting it with the Saima Lake in Finland; the Svir, by which the surplus waters of the Lake Onega are poured into it; the Volkhov, by which it communicates with Lake Ilmen; and the Siass, like the latter, from the south. It discharges its surplus waters by the Neva into the Gulf of Finland. Its shores are generally low; on its north-west and south banks are situated Sordobal, Kronsberg, Kek-holm, Schlussemburg, and New Ladoga. It has several islands, chiefly towards its north extremity; and is so full of rocks and quicksands, and subject to storms, that to avoid it Peter the Great began, in 1718, the Ladoga Canal, from New Ladoga on the Volkhov, to Schlussemburg on the Neva, along the south shore of the lake, a distance of about 70 miles. This work was finished under the Empress Anne, in 1732. It is annually navigated by an immense number of boats, chiefly with merchandise for St. Petersburg. The canals of Siass and Svir form, with that of Ladoga, a continuous chain of communication round the south and south-east shores of the lake; and the Canal of Tikhvine (Novgorod) places it in direct connection with the Volga.

LADRONE ISLANDS, a group in the North Pacific, belonging to Spain, extend between 13° and 20° 30' N. lat., and between 144° and 145° 30' E. lon., and are about twenty in number, with an area of about 420 square miles. They are mostly of a volcanic character, and are very rugged; but they yield nearly every kind of intertropical product, such as cotton, rice, indigo, Indian corn, sugar, cacao, cocoa-nuts, tobacco, plantains, &c. Cattle, horses, mules, and asses are numerous, and the llama has been introduced from Peru, and thrives well on the mountains. The principal island is Guajan, which is about 90 miles in circumference. Its capital, South Ygnacio de Agaña, is fortified, and has an open roadstead, and a good harbour a

few miles further north. Tinian, another island, exhibits extensive ruins, which indicate that these islands were once inhabited by a people well acquainted with the arts of civilization. The islands were discovered by Magellan in 1521, and were settled by the Spaniards in the middle of the next century. The aborigines have now almost disappeared, and the Spaniards are few, the chief inhabitants being settlers from Mexico and the Philippines. The total population of these islands was once 100,000, but is now greatly reduced, probably to not more than about 6000. The name Ladrone Islands, or Islands of Thieves, is said to have been given to them by Magellan, because the Indians stole everything made of iron within their reach. At the latter end of the seventeenth century they obtained the name of the Mariana, or Marianne Islands, from the Queen of Spain, Mary Ann of Austria, mother of Charles II., at whose expense missionaries were sent thither to propagate the Christian faith.

LADY (Old Eng. *hlæflice*), a title of distinction corresponding to Lord. It belongs to peeresses and the wives of peers, as a prefix to the peerage title. The daughters and daughters-in-law of dukes, marquises, earls, and peers, are also entitled to it. To the wives of baronets and knights is legally given the prefix "Dame," but they are now by courtesy always addressed as "My Lady" and "Your Ladyship." The word *lady* is used in common speech as a correlative of gentleman. The original significance of the word *hlæflice* is a little uncertain. *Hlaf* is of course our modern *loaf*, but the suffix *dige* is much disputed over. The Old English *degge*, a kneader, whence comes our modern word *dough*, is given by Professor Skeat (the foremost authority on the subject) as the most likely derivation. By this the entire word would be made to mean "loaf-kneader," i.e. breadmaker—a very appropriate title for the mistress of a house.

LADYBIRD (Coccinellidae) is a family of beetles belonging to the section TRIMERA. These well-known little beetles are remarkable for brilliant colouring, being generally red or yellow, with black, red, white, or yellow spots adorning the elytra. In the majority of forms the body is hemispherical. The antennae are very short, and retractile beneath the prothorax; the last three points form a club. The maxillary palps are remarkable for the curious hatchet-shape of their last joint. The legs are short. They creep slowly but fly well. Nearly all the ladybirds, both in the larval and perfect state, prey on the Aphidæ or plant-lice. The eggs of ladybirds are smooth, oval, and of a yellow colour. They are usually gummed by one end to the underside of leaves, and are placed in clusters. When hatched the larva is generally black and slender-bodied, tapering behind, and with six legs in front, looking very much like a miniature lizard or crocodile. As it grows it becomes spotted with red or yellow tubercles. After having attained its full dimensions, which is not before it has eaten hundreds of aphides, it glues its tail to a leaf or post; and, hanging with its head downwards, the skin cracks down the middle of the back, and the smooth pupa may be seen partly protruding out of the prickly skin of the larva, which still continues in some species to cover the pupa on each side and beneath. About a fortnight later the pupa skin is rent, and the perfect insect emerges. Several generations succeed one another so long as the summer lasts; in the autumn the survivors take shelter in nooks, often in ceilings of houses, and remain dormant through the winter. The common species (*Coccinella septempunctata*) ranges over all Europe and parts of Asia and Africa. It is very abundant in Britain, appearing sometimes in immense swarms, especially on the southern and eastern coasts. Upwards of 1500 species of ladybirds have been described, of which only forty occur in Britain.

LADY-CHAPEL, a chapel frequently attached to cathedrals and ancient churches, dedicated to the Virgin Mary. Lady-Chapels are usually elegant specimens of architecture,

and have often been used as burying-places for renowned and illustrious personages. Henry VII.'s Chapel is the Lady-chapel of Westminster Abbey.

LADY-DAY, the day of the Annunciation of the Holy Virgin, 25th March. It is one of the immovable festivals of the English Church, and precedes the day of Christ's Nativity by nine months.

LÆLIUS, CAIUS, surnamed *the Wise* (born B.C. 186, died about 115), a Roman noble of great distinction in his own day, is memorable to us chiefly for the large share he is known to have had in polishing the comedies of Terence, and for a friendship with the Scipios so famous that it passed into a proverb, and was taken as the subject of a most charming treatise by Cicero. The "*Amicitia*" (Friendship) indeed bears the name of Lælius, its full title being "*Lælius sive de Amicitia*," and the principal speaker is Lælius himself. He is also one of the speakers in the companion dialogue-treatise "*De Senectute*" (Old Age), and in the "*Republic*" of the same author. His own orations were studied down to the close of the Republic as models of polished smoothness, but none of them remain to us. As one of the leaders of the nobility Lælius served the various great offices in turn; was tribune B.C. 151, prætor 145, consul 140. From B.C. 132 to 122 he took a considerable part against the popular risings. But what lives of him is simply his reputation for blameless life, for wide and liberal culture, and for lofty character. Two centuries later Seneca could find no better model, when he adjured his friend to "live like Lælius." It is enough to stimulate reflection when one considers that, without a single noteworthy deed, the high character of Lælius has kept him in honour for over twenty centuries.

LAENDLER or **LANDLER**, a sort of slow waltz-like measure danced in Styria, Bavaria, and Bohemia, deriving its name from the river Landel. Its music should be rustic in its simplicity, and it has on this account been chosen as one of the classical "dance-forms" by Beethoven and Schubert, and by several moderns.

LAFAYETTE, MARIE JEAN PAUL ROCH YVES GILBERT MOTIER, MARQUIS DE, a soldier and politician, was born at the Castle of Chavagnac, in Auvergne, France, 6th September, 1757, shortly after the death of his father, who fell at the battle of Minden. He came of an ancient and wealthy family, and after completing his education at the Collège du Plessis in Paris, married at the early age of sixteen a daughter of the Duc d'Ayen. After serving for a short time in the French army, he resolved to offer his services to the English colonists in America, who had revolted against the rule of Great Britain, and fitting out a ship at his own expense he reached America in 1777. He volunteered to serve in any capacity at his own expense, and gaining the friendship of Washington he was appointed to the command of a division of the colonial army. He received a wound at the battle of Brandywine, fought in the battle of Monmouth, and was employed in the retreat from Barren Hill and the re-embarkation of Sullivan's troops after the failure of the attack on Rhode Island. When Great Britain declared war against France in 1778 he returned to his own country and exerted all his influence to obtain assistance for the colonists, to whom he returned in the beginning of 1779. Being charged with the defence of Virginia, he showed much skill in baffling Arnold and Cornwallis, and contributed to that series of successes which ended in the capitulation of the latter at Yorktown in 1781. After this Lafayette returned to France, where he occupied himself in the preparation of a combined French and Spanish expedition against the West Indian Islands, but which was never sent, owing to the conclusion of peace in November, 1782. He paid a third visit to the United States in 1784, and was received everywhere with an enthusiastic welcome. His American experiences had confirmed him in his love for political

liberty and national self-government, and he devoted himself during the next few years to the advocacy of the reforms which were so urgently needed in France. He took his seat in 1787 in the Assembly of Notables, where he asked for the convocation of the States-General. When this met in 1789 he attended as the deputy of the nobility of Auvergne, and when it became fused into the National Assembly he presented for its acceptance a declaration of rights, which he had drawn up in imitation of the celebrated Declaration of Independence. After the fall of the Bastille, Lafayette was elected general of the National Guard. His position now became one of immense difficulty, and, notwithstanding his nominal authority, he had but little power to restrain the ferocious madness of the mob. His own feelings were in favour of a constitutional monarchy, and he wished to establish this by humane and orderly means; but the savage butchery of Foulon and Berthier, which he was unable to prevent, showed him that a different spirit prevailed among those who had the ear of the rabble. In the attack on the palace, 6th October, 1789, he rescued the queen from the hands of the populace, and afterwards escorted the royal family to Paris. He remained faithful to the king as a constitutional monarch until the flight of Louis to Varennes. The latter event was fatal to the popularity of Lafayette, as he had pledged himself for the stay of the king at Paris; but on the declaration of war against Austria he was appointed to the command of the army of defence stationed upon the northern frontier. In June, 1792, he denounced publicly by letter the Jacobin Club, and called upon the Assembly to suppress it. The same month he appeared before the Assembly in person to demand a charge, but found his influence gone. An attempt was made to obtain his arrest, but this was rejected by a large majority. After the events of the 10th August, he attempted a federation of certain departments in opposition to the authority of Paris, but failing in this, took flight across the frontier, where he fell into the hands of the Austrians. For the next five years he remained a prisoner, but in September, 1797, he was set at liberty at the request of Napoleon. He was not allowed to enter France until the latter became First Consul, and when he did return it was to spend many years in quiet retirement on his own estate. During the Hundred Days he was elected vice-president of the Assembly, and after Waterloo he took a prominent part in promoting the abdication of the emperor. He sat in the Chamber of Deputies for Meaux from 1818 to 1821, but exercised very little influence. In 1821 he paid a visit to the United States, where he was received with the most fervent expressions of popular admiration, and received from Congress a township of land and 200,000 dollars. He took a prominent part in the revolution of 1830, and held once more his old command at the head of the National Guard, resigning his commission after the establishment of the new government. To the end of his life he remained true to his ideal of liberty, his last speech in the Chamber, in 1834, being on behalf of political refugees, and the last lines he wrote were in reference to negro emancipation. He died at Paris, 20th May, 1834. (See "*Mémoires, Correspondance et Manuscrits du Général Lafayette*," six vols., Paris, 1837-38, edited by his family.)

LAGENARIA. See BOTTLE-GOURD.

LAGO MAGGIORE. See ITALY.

LAGOMYS. See CALLING HARE.

LAGOON or **LAGUNE** (Lat. *lacuna*). Lagoons are pools or lakes formed either by the encroachment of rivers or seas upon the land, or by the separation of a portion of the sea by the intervention of a bank. Thus there are fluvial and marine lagoons. The former are not confined to the lower parts of water-courses, though they are most frequently there. Marine lagoons are the most common. In Europe there are several; the Adriatic, in its north and north-western parts particularly, is full of them.

LA'GOS, a British settlement and port of West Africa, now included in the Gold Coast Colony, and situated at the mouth of the Lagos River, 110 miles west of Benin. It is situated on the north side of an island in a lagoon, protected from the swell outside by spits of land, and is a place of considerable trade in sugar, cotton, palm oil, tobacco, coffee, and ivory. The trade in slaves was forcibly suppressed here by the British in 1851, and treaties were also entered into for putting an end to human sacrifices and protection of missionaries. It communicates with Abeokuta by the river Lagos or Ogu, and there is an in-shore passage by lagoons to Benin. Since 1876 the Lagos settlement includes all British possessions between the second and fifth degrees of east longitude. Including the town of Lagos, the population of the settlement, within these limits, in 1881, was 72,570. The European trade is largely in the hands of the French-Germans.

LAGRANGE, JOSEPH LOUIS, one of the greatest of modern mathematicians, was born at Turin, 25th January, 1736. His father was of French extraction, and was paymaster of the forces to the Duke of Savoy. The early studies of Lagrange were directed rather to classical and literary subjects than to mathematics, but the perusal of a memoir of Dr. Halley awakened an enthusiasm for the study of the latter, which soon showed the true bent of his intellect. Within three years from this event he had reached the level of the greatest of his contemporaries, and at the age of nineteen he addressed a letter to the celebrated Euler giving an account of some researches which laid the foundations of the calculus of variations. In the same year, 1754, he was appointed professor of geometry at the military college of Turin, where by far the greater number of his pupils were older than himself. In 1758 he took an active part in the foundation of a learned society, which afterwards became the Academy of Sciences of Turin, and the following year published in its *Transactions* some of his researches on the propagation of sound, the integration of differential equations, and those of finite differences. In 1764 Lagrange gained the prize of the Academy of Sciences of Paris, for a memoir on the libration of the moon, the first real proof of the inequality of the moon's shape. He showed that the moon's rotation, though so slow, would cause her to bulge out slightly round her equator, and that just as the moon causes tides on the earth, so the earth in turn would pull upon the moon, and drag her into a slightly elongated shape, whose elongation would point towards the earth's centre. Therefore when in her revolution this axis is turned a little to one side, the earth's attraction pulls it back again, and thus is kept up a constant small oscillation. In 1766 he again gained the Academy's prize with a splendid memoir on the theory of Jupiter's satellites, the mathematical difficulties of which he overcame, but left certain points still undetermined, which were to swell the fame hereafter of Laplace. In 1766 he succeeded Euler as director of the mathematical department of the Berlin Academy. Frederick's invitation ran that "the greatest geometer of Europe should be near the greatest of kings." He had already been made an honorary member of this academy in 1759. This position he retained until 1787, and during this period he contributed sixty important scientific papers to the *Memoirs* of this society. In 1787, after the death of Frederick the Great, he removed to Paris, where he was well received by the court, and the following year there appeared under the editorship of Legendre his first and greatest separate work, the "*Mécanique Analytique*," one of the most remarkable monuments of human genius. The design of this treatise was the reduction of all mechanical questions to the principle which in one shape is called that of virtual velocities, and in another shape that of the conservation of moments—the word "moment" being used to denote the product of a force into the magnitude of the change which it tends

to produce. In 1790 Lagrange took part in the establishment of the metrical system of weights and measures. In 1793, when the decree for the expulsion of aliens was pronounced during the "Terror," a special exemption was made of Citizen Lagrange on account of his special utility to the republic. The task set him by the revolutionary government was to elucidate more exactly the theory of projectiles to aid their armies in gunnery. Like Lavoisier and Bailly, fellow-scientists, Lagrange too was in danger of his life more than once; but more fortunate than they, he escaped unharmed from the mad fury which then raged throughout France. In 1794, on the foundation of the École Polytechnique, he was appointed its professor of mathematics. In this capacity he published in 1797 his great "*Théorie des Fonctions Analytiques*," and in 1798 his "*Résolution des Équations Numériques*."

Napoleon entertained a great respect for Lagrange. Such little science as he knew was mathematical. Besides he never forgot those who assisted him in his rise to power, and this service quite unwittingly Lagrange had rendered. In the reconstruction of society the universal respect for his attainments had caused his name to be put down first when the Institute of France was built up out of the ruins of the old Académie Royale; and it was therefore Lagrange's duty, as first member of the Institute, to receive Napoleon when he returned from the conquest of Italy, a duty he performed greatly to the victor's satisfaction. When Napoleon was named (rather absurdly) a member of the Institute, Lagrange was always ready to support him, and undoubtedly was of great service in this trying position, which for many reasons Napoleon dared not refuse. Under the consulate and empire honours poured thick upon him from his "colleague." He became a member of the senate, a count of the empire, and a grand officer of the Legion of Honour. The last years of his life were devoted to the issue of a second and improved edition of the "*Mécanique Analytique*," the first volume of which was issued in 1811, but he did not live to complete this undertaking. He continued working with indefatigable zeal until his health gave way, and he died 10th April, 1813, at the age of seventy-three.

It is a noteworthy trait of the born observer and calculator, and a proof of the adage, "the ruling passion is strong in death," that Lagrange carefully watched and recorded the phenomena of his last illness so soon as he felt it was fatal, that his death might be of service to physicians. Possessed of a rare genius for mathematical research he improved his powers by tireless industry, and though he was troubled throughout the greater part of his life with feeble health and a tendency towards melancholy, a strict temperance in all things enabled him to retain his mental vigour to the end of his long life. In addition to the great works already mentioned he contributed to the world of science some valuable discoveries in connection with the planetary theory, the perturbations of Jupiter's satellites, the theory of probabilities, the dynamics of fluids, &c. His complete works, with a memoir of his life, have been published by M. J. A. Serret in seven 4to volumes (Paris, 1866-67). (See also Virez and Potel, "*Précis Historique sur la Vie et la Mort de Lagrange*," Paris, 1813.)

LAHORE, a municipal city, and the capital of the Punjab Province, British India. It is situated near the Ravi, the middle of the five rivers from which the country is named. Hindu tradition traces its origin to Rama, the hero of the Ramayana, whose two sons, Loh and Kashi, founded the sister towns of Lahore and Kasur. The name has probably been corrupted from Lohawar, or from a still earlier Sanskrit form, Lohawarana. Though little can now be recovered with regard to the date of its foundation, the absence of all mention in Alexander's historians, and the fact that coins of the Greco-Bactrian kingdom are not found among the ruins, lead to the belief that Lahore did

not exist as a town of any importance during the earliest period of Indian history. Governed originally by a family of Chauhan rajputs, a branch of the house of Ajmere (Ajmir), Lahore fell successively under the dominion of the Ghazni and Ghori sultans, who made it the capital of their Indian conquests, and adorned it with numerous buildings, almost all now in ruins. But it was under the Mogul Empire that Lahore reached its greatest size and magnificence. Akbar enlarged and repaired the fort, and surrounded the town with a wall, portions of which still remain, built into the modern work of Ranjit Singh. Specimens of the mixed Hindu and Saracenic style adopted by Akbar survive within the fort, though largely defaced by later alterations. Under Aurangzebe, Lahore began to decline in population. Even before his time, the foundation of Jahanabad or modern Delhi had drawn away the bulk of the classes dependent upon the court; and the constant absence of the emperor contributed still more to depress the city. From the accession of Bahadur Shah till the establishment of Ranjit Singh's authority at the beginning of the present century, the annals of Lahore consist of successive invasions and conquests by Nadir Shah, Ahmad Shah, and many less famous depredators. The magnificent city of the Mogul princes and their viceroys sank into a mere heap of ruins within its shrunken walls; while outside, a wide expanse of broken remains marked the site of the decaying towns which once surrounded the metropolis. But the rise of Ranjit Singh's empire made Lahore once more the centre of a flourishing though ephemeral kingdom. In 1846 the British Council of Regency was established at Lahore, and in 1849 the young Maharajah Dhulip Singh transferred the government of the Punjab to the East India Company. Lahore thenceforth became the capital of a British province, and a new impetus was given to its rising prosperity. In 1849 the environs still remained a mere expanse of crumbling ruins, and the houses of the first European residents clustered around the old cantonment, on a strip of alluvial lowland south of the town, running parallel to a former bed of the Ravi. Gradually, however, the station spread eastward, and now a new town covers a large part of the area once given over to ruins and jungle, while every year sees fresh additions to the renovated capital.

Modern Lahore covers an area of 640 acres, surrounded by a brick wall, which formerly rose to a height of 30 feet, and was strengthened by a moat and other defences. But the moat has been filled in, and the wall lowered to a uniform elevation of 16 feet. A garden now occupies the site of the trench, and encircles the city on every side except the north. Though built upon an alluvial plain, the debris of ages has raised the present town to a position upon a considerable mound. A metalled road runs round the outer side of the rampart, and gives access to the city by thirteen gates. The citadel or fort rises upon a slight but commanding eminence at the north-eastern angle, and abuts northward on the old river-bed, while the esplanade stretches over an open space to the south and east. Within the city, narrow and tortuous streets, ending in *culs-de-sac* and lined by tall houses, give Lahore a mean and gloomy appearance; but the magnificent buildings of the Mogul period serve to relieve the general dullness of its domestic architecture. On the north-eastern side especially, the mosque of Aurangzebe, with its plain white marble domes and simple minarets, the mausoleum of Ranjit Singh, with its rounded roof and projecting balconies, and the decorated façade of the Mogul palace, stand side by side in front of an open grassy plain, exhibiting one of the grandest *coups d'œil* to be seen in India. Outside the wall, with a general southerly direction, lies the European quarter. The chief public buildings and institutions include the Punjab University College (endowed by several native rajahs and nawabs), the Oriental College, the Lahore Government College, the medical school, and the Mayo Hospital.

Lahore possesses comparatively little trade, its business being almost confined to the importation of supplies for the consumption of the inhabitants. Small manufactures of silk and gold or silver lace form the chief source of export trade. Railways connect it with most other parts of the province. In the fort are preserved the hair, sandals, and staff of Mohammed, brought by Timur to India, and long held by Ranjit Singh, who refused a lac of rupees for one of the sandals. They are only exhibited on rare and extraordinary occasions, such, for instance, as when the Prince of Wales visited Lahore in 1876. The population of Lahore is 120,000.

LA'IS, one of the most beautiful of the Greek *hetairai*, contemporary and rival of Phryné. Like so many of the extraordinary women who adopted this profession (so revolting to ourselves), Laïs was endowed with abilities as well as beauty far beyond the common; and among her lovers counted the distinguished philosopher Aristippus, founder of the Cyrenaics, and pupil of Socrates. Laïs was a Sicilian by birth, but was taken to Corinth as a child. It is said that she was stoned to death while on a journey to Thessaly by the wives of the Thessalian mountaineers, jealous of her wondrous beauty, about B.C. 390.

LA'TTY, persons not clergy; that is, the whole population except those who are in holy orders. All the lexicographers agree in deriving it from the Greek word *laos*, the people. A *layman* is one of the laity. [See **CLERGY**.] The word laity appears to have been first used in the second century, when the priests began to be looked upon as a separate class—intermediate between Christ and the people. The laity at first possessed great influence in the church, but it gradually declined, as the priests became more and more powerful, and in the year 502 they were forbidden to interfere in any affairs of the church whatever. The distinction has never been so marked in the Protestant as in the Roman Catholic Church.

LAKE, a pigment formed by precipitating colouring matters with a metallic oxide or earth; oxide of tin and alumina are the substances usually employed. Red lakes are made from carmine or madder; the solutions of cochineal and madder are precipitated by alum. The dried precipitate forms the lake. Yellow lakes are made in the same way from fustic, turmeric, or annatto; blue lakes from indigo; and green lakes by mixing blue and yellow lakes.

LAKE, a depression in the land containing an accumulation of comparatively still water. Lakes have been roughly divided into two classes, *fresh-water* and *salt lakes*. The cause which produces the essential difference between these classes being the relation of the rainfall to the evaporation, the difference is dependent on whether the total amount of rainfall in the drainage area exceeds or is only equal to the total amount of evaporation in that area. In the first instance, where the supply exceeds the loss, the overplus is carried off by a channel or outlet; the waters of the lake being thus constantly renewed they are fresh. In the other instance evaporation carries off all the rainfall: in the water of the lake there is a constant accession of material in solution, the inflowing rivers always bearing a minute proportion, which keeps on accumulating in the lake as evaporation removes the excess of water. The waters of such lakes are therefore more or less saline: they are called *salt* or *bitter lakes*, and in some cases, where of large size, *inland seas*.

From a geological point of view lakes have to be considered, first, [as to their formation or mode of origin; secondly, as to their function, or the part they play in the geological economy. As to the formation of lakes, several distinct modes of origin can be recognized. Some lakes that occur on extensive plateaus—evidently but recently elevated marine areas—are some of the hollows in an originally uneven sea-bottom. Other lakes appear due to

the local subsidence of the area into some subterranean cavity; or, in some cases, to the elevation of the surrounding land. A large number of lakes are due to erosion, which may be either chemical, removing the soluble salts and causing disintegration of the strata, or it may be the direct abrasion of the rocks. This latter has mostly been the result of glacial action. Some lakes, but generally of small dimensions, are due to local masses of drift, peat, or other surface accumulations, impounding water in some confined place. Lakes may also occur in old volcanic craters.

In districts raised above the sea, within comparatively recent times, lakes both salt and fresh occupy many of the depressions. The salt lakes are often of the same composition as concentrated sea-water, thus showing that they are isolated portions of the ocean that have become very highly concentrated by evaporation. Other similar lakes appear to have become fresh after the elevation of the district; but owing to subsequent alterations in the rainfall and evaporation, the supply not being equal to the loss, the effluent stream ceased, the lake concentrated, and eventually became more or less salt.

A large portion of Eastern Russia is a marine area of but comparatively recent elevation. It is an arid district, and a number of the large lakes are salt. There is distinct evidence of this ancient sea having formed a connection between the Arctic Ocean and the Mediterranean Sea. In some of the isolated patches of water, as the Caspian Sea, Lake Baikal, there are seals closely allied to those of the Arctic Ocean; but in the Caspian the mollusca are similar to those of the Black Sea. Of the other lakes of this district may be mentioned the Sea of Aral, Lake Balkash, Lake Elton, all highly salt, some almost saturated. The average composition of the water of the Caspian shows it to be less salt than ocean water. It therefore appears that at one time the supply to this sea was in excess of the evaporation, and that there was an outlet to the Black Sea; this is further supported by the similarity of the mollusca in the two seas. Subsequently, owing to an alteration in the relation of the rainfall and amount of evaporation, the latter becoming more than sufficient to carry off the excess of water, the outlet ceased to exist and the surface of the sea lowered till an equilibrium was established between the supply of water and the surface exposed to evaporation. This is the condition of the Caspian Sea at present; the Volga flows in at the north and keeps up the supply, but to the south evaporation is so excessive that in some of the confined bays the water is almost a saturated salt-solution. The Black Sea might almost be considered as a lake with an outlet: the excess of water carried in by the large rivers Danube, Dniéper, Dniester, and Don finds an outlet through the Dardanelles; the waters of this sea, though salt, are less so than ocean water. In the Red Sea and Mediterranean the reverse is the case; here evaporation is compensated for by a supply from the ocean; the waters are therefore very salt.

The valley of the Jordan bears evidence of having been submerged; it was probably connected with the Gulf of Akabah to the south. Now the centre of the drainage is the Dead Sea, which is very saline, and whose level is about 1360 feet below that of the neighbouring seas. The other lakes, as the Lake of Gennesareth, are kept fresh by the Jordan flowing through them. On the isthmus of Suez are several large bitter lakes; they are isolated patches of the adjoining sea that have been refilled from time to time by incursions of the sea. Intermittently they have deposited salt for a long period, a great thickness of saliferous strata having been pierced when cutting the Suez Canal.

In equatorial Africa there are several very large lakes; these are considered to have been holes that existed in the sea-bottom before this district was converted into land. The large amount of fresh-water drainage passing through

them has converted them into fresh-water lakes. A large district in North Africa, some of which is occupied by the Sahara Desert, is much below sea-level; this was evidently a large inland sea, but it has dried up for lack of rainfall.

In North America a large portion of the western plains were evidently very recently submerged. In many of the hollows bitter and alkali lakes occur; some of these are permanent, others are only filled on the melting of the winter snow, but are wholly dried up in the fall of the year, leaving a white crystalline deposit. In the soil in the vicinity of such lakes selenite is abundant. The large group of lakes in the North-west Territories north of Winnipeg had formerly a much wider extension, much of the rich prairie land of Manitoba being the filled-up portion of this large inland sea. The great chain of lakes between British and United States territory are also but the reduced remnants of a much vaster sheet of inland water. The great Salt Lake of Utah appears to lie in a depression formed by the plication of the strata of that district. Formerly it had much larger dimensions and an outlet to the Pacific. Its ancient extension, as worked out by the United States Geological Survey, has been named Lake Bonneville. The waters of this lake have become so concentrated that it is almost a saturated salt solution.

The formation of lakes by the actual local subsidence of land is uncommon; but that such a cause is possible is evident, as large subsidences occur in Cheshire, where salt is obtained by pumping brine; these depressions sometimes fill with water. In the Mississippi valley, after the earthquakes of 1811 and 1812, several lakes were formed by the depression of the ground. Lake Superior, in North America, is considered to have been formed by the subsidence of the area into a large subterranean cavity; a somewhat similar origin has been ascribed to Lough Neagh, Ireland.

Chemical erosion produces lakes in soluble strata. Calcareous rocks are acted upon by waters containing carbonic acid. The solution of the carbonate of lime causes disintegration of the rock; therefore, in limestone rocks, lakes formed in this manner are abundant, fissures and natural lines of drainage becoming much enlarged. Lakes are often found near the junction of calcareous and non-calcareous rocks, the waters flowing off the latter being highly charged with the essential solvents. Examples of lakes due to chemical erosion are abundant. The great chain of lakes in North America trend along the outcrop of the more soluble calcareous strata. In the British Isles similar lakes occur in the Carboniferous limestone. The lakes along the Shannon, Loughs Allen, Ree, and Derg, are of this class, also Lough Earne and Loughs Corrib and Mask in Galway, which lie near the boundary of the Carboniferous limestone and the older Palæozoic of the west.

In north temperate regions glacial action has been the most fruitful source of lakes. The mountainous districts of the British Isles—the Highlands of Scotland, Cumberland, Wales, and Ireland—teem with rock basins and lakes formed by old moraines, &c., lying athwart the valleys and damming back the water. The rock-basins have been scooped out by glaciers pressing along the valleys. They generally occur below some steep declivity, or at an angle in the valley where the ice pressed heavily on the concave side similar to the hole formed at the sharp bend of a river. Such basins are therefore crescent-shaped, Lake Geneva being one of the largest examples, but in the British Isles many occur on a smaller scale. Around the Alps several of the lakes are of great size and depth. The bottom of Maggiore, in Italy, is far below sea-level. In both Northern Europe and America glacial lakes are very numerous, but most of them appear to be comparatively small holes excavated by a vast moving mass of ice in the soft portions of the underlying rock. They differ therefore somewhat in their form and mode of origin from those lakes scooped out by a glacier moving along a confined valley.

The function of lakes, among geological agents, is that of accumulators of sediment. A small amount of erosion by wind-waves takes place around the edge, and in the case of large bodies of water they have an appreciable effect on meteoric agencies by rendering the climate more temperate and humid.

The accumulations in lakes may be of sedimentary, organic, or chemical origin. Lakes act as filters to the rivers passing through them; sediment held in suspension deposits in the quiescent water, and matter held in solution is often extracted by organic agencies or by some chemical reaction. The sediments carried into lakes are similar to those carried to the sea; the resultant deposits are more various and very liable to alteration within narrow limits, owing to the different sediments brought in by different streams when flooded. Towards the margin of the lake the deposits are mostly gravel and sand, the finer sediments being laid down towards the centre and the mouth of the effluent river. Deltas accumulate at the mouths of the inflowing rivers; they are composed of coarser material, especially in mountainous districts, where the streams are rapid and turbulent, and where glaciers occur. A large part of the Lake of Geneva, where the Rhone enters, has been filled by sediment carried from the Mer de Glace. Where the waters enter at the upper end they are quite turbid, but before leaving the lake they are perfectly clear. Many of the lakes in the British Isles—the loughs and tarns—are filled by like alluvial deposits at one extremity. Not infrequently a river entering at the side of a narrow lake may throw out such a large delta as to extend quite across the lake and convert it into two.

The organic deposits of lakes are mostly of vegetable origin. Some are, however, due to the agency of animals. In some lakes, both in Scotland and Ireland, there are accumulations of shell-marl formed of the shells—entire and comminuted—of certain fresh-water gasteropods. The lake iron ores of Smaland (Sweden) are considered to be accumulated by infusoria. They occur in patches on the slopes and shallows adjoining the reed banks of many of the lakes. Several varieties of the ore are recognized according to the form in which they occur—such as pearl, money, cake, and gunpowder ores, containing from 25 to 50 per cent. of iron. Where these ores occur the raising of them forms an important industry that is chiefly prosecuted when the lakes are frozen over. The claims are then laid out on the ice, in which holes are cut for dredging up the ore. The deposit becomes renewed after a few years. Bog iron ore in some instances is accumulated by a minute plant, *Gallionella ferruginea*. Of the other organic deposits in lakes may be mentioned peat, which in some instances grows out along the surface of the water, ultimately covering it completely with a thick floating mass. In wooded districts fallen timber is carried in large quantities into the lakes in time of flood. Here, on becoming water-logged, they sink. Where winds from a particular direction are prevalent these may accumulate in such quantities in particular bays as to form eventually important beds of lignite.

The chemical deposits of lakes take place most abundantly in those having no outlet, the water being removed by evaporation; deposition of the material being the result of supersaturation. In some fresh-water lakes chemical deposition to a slight extent takes place under certain conditions. In some lakes of peaty waters where iron enters in solution it is soon deposited, and if there is an absence of ordinary sedimentation and a continuous supply of the ferruginous solution, a large deposition of limonite may result. When a strong calcareous spring enters a lake deposition of carbonate of lime often ensues, owing to the escape of carbonic acid. Hot springs will deposit silica, as in the Yellowstone Lake, North America, and at the hot springs of New Zealand. Chemical deposition in salt

lakes is of special interest in geology. From formations that have evidently originated in this way several commercial articles are obtained. Each of these inland seas is the recipients of the drainage of a certain area. This drainage contains in solution certain salts washed out of the rocks of the district. Although, in the rivers, the proportion of matter in solution is extremely minute, in the closed lake that proportion is largely increased on the constant removal of the water by evaporation. The substances carried in solution are chiefly carbonate and sulphate of lime, and chlorides of soda and magnesia, with much more minute quantities of some other salts. These go on increasing in the closed lakes, and as the solution concentrates certain of them are deposited. The carbonate of lime owes its solution to the presence of carbonic acid in the water; as this escapes the lime is deposited. Of the other salts, sulphate of lime is the least soluble; as, therefore, concentration proceeds it is one of the first to deposit, then follows chloride of soda. As this continues the waters of the lake remain practically as a saturated salt solution, but the percentage of the more minute ingredients increases. The Salt Lake of Utah is a saturated salt lake that deposits salt intermittently. From the Dead Sea already large quantities of salt have been deposited. Its waters are highly concentrated mother-liquors containing a large proportion of chloride of magnesia. Lake Elton is a still more highly concentrated lake; its waters are almost pure bittern. The composition of these lakes varies according to the strata of the drainage area: from ordinary sedimentary strata alkaline chlorides predominate; from volcanic rocks, alkaline carbonates. These latter are called alkali lakes. Examples occur in Hungary, Lower Egypt, and Persia, besides in several parts of America.

LAKE DISTRICT, THE, a district of England, embracing parts of Cumberland, Westmorland, and Lancashire, about 45 miles long north to south, and 30 miles broad. It is occupied by a group of bold mountains composed of hard slate rocks, in the valleys among which there are many beautiful lakes. The centre of the district is the mountain called Great Gable, with an elevation of 2925 feet; from its valleys radiate off in all directions:—Ennerdale, Wastdale, Mitterdale, Eskdale, Langdale, Borrowdale, Lortonvale, &c. In these vales the lakes are situated, usually in the lower parts, and there are besides many small lakes or mountain tarns at much greater elevations. The principal mountains are Scawfell Pike and Scawfell, immediately south of Great Gable, 3208 and 3161 feet respectively, the former the highest mountain in England; the Pillar, 2927 feet; Bowfell, 2960 feet; Helvellyn, 3118 feet; Fairfield, Rydalhead, 2862 feet; Skiddaw, 3058 feet; Saddleback, 2847 feet; Grassmoor, 2805 feet; Gristdale Pike and Cawsey Pike, west of Derwentwater, 2605 and 2030 feet; Langdale Pikes, 2101 and 2323 feet; Conistone, in the south of the district, 2633 feet; High Pike, in Catterall Gorge on the north, 2165 feet. The principal lakes are Derwent and Bassenthwaite on the north; Buttermere, Crummock, and Loweswater on the north-west; Ennerdale and Wastwater on the west; Conistone, Esthwaite, and Windermere on the south; central, Elter, Grasmere, Rydal, and Thirlmere; north-east, Haweswater and Ullswater. Many others are mere tarns. The Skiddaw slate is the oldest rock of the district; it occupies a band along the north, and has yielded a very few fossils. It is succeeded south by a band called the green slate and porphyry, embracing Helvellyn, a peculiar mixture of igneous rocks with sedimentary deposits; this is followed southwards by the Silurian slates, with numerous organic remains, the boundary being marked by a peculiar and persistent band called the Conistone limestone, which crosses the entire district, west-south-west to east-north-east, and comes end on against the granite of the Shap Fells. On the north side of the district, north of Skiddaw, the middle slates have a very slight

development, being unconformably overlain by newer deposits. These are Old Red Sandstone, and over it limestone, which succeed the Silurian slates at much lower levels round most parts of the outer boundary of the district. Granite appears in the district at comparative low levels, intruding amid the slates in isolated bosses, the largest of which is that of the Shap Fells, where it occupies about a square mile in area and rises to 120 feet. It appears also in Skiddaw Forest between Skiddaw and Saddleback, and again at the foot of Wastwater, and thence by Eskdale. Syenites and porphyries occur as intruded masses in many places. The Shap granite has been widely dispersed eastwards across the Pennine chain, even to the East Yorkshire wolds, many of the blocks being of great size. The directions in which this remarkable transport has taken place are nearly marked by the curve extending from the north-east to the south-east points of the horizon. The group of the Lake Mountains is separated from the Pennine chain or backbone of England by the basin of the Eden (Peterell and Eden), which gradually rises from Carlisle by Penrith, till it attains its highest level, 960 feet, a mile south of Shap-village. A few miles south of Shap, the hills in the south-east of the district come into close proximity to the high group of the Howgill Fells east of the Lune.

LAKE-DWELLINGS, the name given to such habitations as are constructed over the waters of lakes at some distance from the shore. The earliest historical mention of such abodes yet discovered is that found in the works of Hippocrates and Herodotus, both of whom wrote in the fifth century B.C. In the fifth book of the latter (chap. vi.) he gives a full description of the village erected upon piles over the waters of a certain lake. Præsius, the inhabitants of which successfully defied the efforts of a Persian satrap to reduce them to subjection. The geographical work of ARULFEDA (1273-1331 A.D.) also contains a reference to the existence of some dwellings of a similar character erected over the waters of the Apamæan Lake, and inhabited by fishermen; but the subject of lake-dwellings received very little attention from archaeologists until nearly the middle of the present century. In the year 1839 the draining of a small lake in the county of Meath, Ireland, led to the discovery of the remains of an ancient dwelling-place that had formerly existed within the margin of its waters, and the interest excited by this discovery led to further investigations elsewhere. Remains of similar erections were found to be very numerous in other parts of Ireland and also in Scotland [see CRANNOGH], and in 1853-54 a still more interesting discovery was made in Switzerland. Owing to the unusual dryness of the winter the lakes of that country had sunk to an abnormally low level, and an attempt was made to reclaim a portion of the bed of the Lake of Zurich. This led to certain excavations which revealed the existence of the remains of numerous piles which had been driven into the bed of the lake, and of an immense quantity of primitive weapons, tools, utensils, fragments of bone, &c., showing that a lake-dwelling had formerly existed there. The attention of a learned antiquary, Dr. F. Keller, was directed to this matter, and his account awakened an interest in the subject of lake-dwellings which caused many further investigations to be made. In a very short time the researches of other archaeologists revealed the fact, that the remains of lake dwellings were to be found in nearly all the shallow lakes of Switzerland, as well as in most of the lakes of Northern Italy, Mecklenburg, Pomerania, Austria, and Hungary, and that in some places these remains were very numerous. In the Lake of Neuchâtel alone the relics of fifty separate villages have been discovered, while twenty-four have been counted in the Lake of Geneva. From the researches that have been made, the general plan on which these dwellings were constructed has been clearly ascertained. The place selected was generally a sheltered bay where there was a gently sloping bottom of firm soil. Into the bottom of the lake,

at a distance of from 100 to 300 feet from the shore, a number of piles were driven to afford support for a platform. The piles consisted of the rough unbarked stems of trees, the ends being either sharpened by the action of fire or by means of hatchets. The wood preferred seems to have been either oak or alder, but the builders used also any other timber that was available. On the level tops of the piles a number of beams were placed, which were fastened by means of wooden pins or by mortising, and on the tops of these beams a platform of rough layers of unbarked stems was laid. This was covered by a few inches of mud or gravel, which was beaten down hard to make a floor. In a few cases the platform has been found to consist of boards obtained by splitting the large stems of trees, and sometimes the piles were further bound together by means of cross timbers below the platform. The dwellings erected upon these platforms appear to have been of a quadrilateral form, the walls being supported by posts and filled in with wattle-work daubed with clay, bark or thatch being used for roofing. Some of these villages were of considerable extent, one on the Lake of Geneva being 1200 feet long by 120 feet wide, a space large enough to form a dwelling-place for over 1000 persons. Some of these lake-dwellings were connected by a narrow causeway with the shore, but others could only be approached by means of boats.

Immense accumulations of remains have been found upon the sites of these dwellings, the examination of which has revealed many things concerning the manner of life of the inhabitants. In some of these only stone tools and weapons have been discovered; others have the remains of bronze implements as well, and a few have yielded swords and tools of iron as well as a few Roman and Gallic coins. The earliest of these remains are believed to indicate that the inhabitants lived wholly by hunting and fishing, but the majority show the existence of a much higher degree of civilization. There is unmistakable evidence that many of these lake-dwellers possessed oxen, sheep, goats, and pigs; that they used dogs and horses; that they cultivated the soil, growing wheat, barley, linseed, and many kinds of fruit; and that they made pottery, matting, linen, cordage, nets, and leather. The remains of 115 species of plants, thirty-seven species of mammalia, twenty-four of birds, four of amphibians, and nine of fish, have been found in the accumulations in connection with the lake-dwellings of Europe. In the face of the unbroken silence of history or tradition as to the time when these lake-dwellers flourished, it is impossible to form any trustworthy estimate of their antiquity. That some of them must have existed within the historic period is evident from their remains, but there are others which seem to belong to a very remote age indeed. Even the earliest remains, however, indicate the existence of considerable intelligence and culture, and show that the inhabitants of these dwellings were far removed from a condition of savagery.

Although the lake-dwellers of Europe passed away or changed their mode of living before their history could be written, structures similar to those they erected are still used in many parts of the world. In South America, in New Guinea, in Borneo, in Celebes, in the Caroline Islands, on the Gold Coast, and in the great lakes of Africa pile-dwellings are common, and the same may be said of Burma and Siam. (See "The Lake Dwellings of Switzerland and other parts of Europe," by Dr. Ferdinand Keller, translated by J. E. Lee, two vols. 8vo, London, 1878; and Sir John Lubbock's "Prehistoric Times," fourth edition, London, 1878.)

LALANDE, JOSEPH JEROME LEFRANÇOIS DE, an eminent French astronomer, was born at Bourg, in the department of Ain, 11th July, 1732. He was brought up for the law by his parents, but devoted himself to the study of astronomy, and in 1751 he was sent by the

French Academy to Berlin to make observations for the determination of the moon's parallax, Lacaille being sent for the same purpose to the Cape of Good Hope. On his return he was appointed one of the astronomers-royal, and in 1762 Delisle resigned in his favour the chair of astronomy in the Collège de France. He retained this professorship forty-six years, and during that period he did very much towards popularizing the study of astronomy. He possessed great talents as a lecturer, and most of his works were of a very practical and useful character. His most important publication is the "Traité d'Astronomie," first issued in two vols. 4to, in 1764 (enlarged edition, four vols., 1771-81; third edition, three vols., 1792). He also published works on astronomy, geography, navigation, and mathematics, and contributed over 150 papers to the Paris Academy of Sciences. Somewhat vain and hot tempered, he was also generous and benevolent, an enthusiastic lover of the science of astronomy, and one who worked diligently and earnestly for its promotion. He also founded a prize, which is still awarded by the Academy of Sciences, for the encouragement of astronomical research. His death took place at Paris, 4th April, 1807.

LALLY, THOMAS ARTHUR, BARON DE TOLENDAL, COUNT DE, lieutenant-general and governor of the French possessions in the East Indies, was born at Romans, in Dauphiné, January, 1702. He came of an Irish family who had emigrated in the train of the Stuarts, and from his boyhood was brought up for the military profession. He took part in the sieges of Kehl and Philippsburg, and greatly distinguished himself at Dettingen, Menin, Furnes, and Fontenoy, being made a brigadier by the king on the field of the latter battle. In 1745 he accompanied the Young Pretender to Scotland, and acted as his aid-de-camp in the famous raid which ended so disastrously at Derby. In 1756, on the breaking out of hostilities between France and England, he was appointed to the chief command, civil and military, in the French East Indies, and after his arrival at Pondicherry, in 1758, he acted with such vigour as to alarm the English commanders. He captured Fort St. David and laid siege to Madras, but in 1759 he was signally defeated by Sir Eyre Coote at Wandewash, and this defeat was followed up by the English until he was besieged in Pondicherry and compelled to surrender, January, 1761. A brave and skilful soldier, he had yet by his imperiousness and inflexibility offended his countrymen, and by his disregard of the caste prejudices of the natives had rendered it impossible to obtain their hearty support. He was sent as a prisoner of war to London, and released on parole, but hearing that the blame for the disasters in India was laid upon him, he went to Paris to confront his accusers. Unhappily for him the public opinion of France demanded a scapegoat, and after a long and tedious trial he was condemned to death, 5th May, 1766. Four days afterwards he was publicly beheaded. "Thus," writes Mill in his "History of British India," "had the French East India Company within a few years destroyed the three only eminent men who had ever been placed at the head of their affairs in India—Labourdonnais, Dupleix, and Lally. It did not long survive this last display of its imbecility and ignorance." The memory of Lally-Tolendal was defended by Voltaire, and in 1778 his sentence was formally reversed.

LA'MAISM is the name given to a corrupt form of Buddhism which prevails as a system of doctrine throughout a large portion of Eastern Asia, Japan, and China, and which exists as a political as well as an ecclesiastical organization in Tibet. As mentioned in the article **BUDHISM**, the teaching of the founder of that system of religion proved too lofty for general acceptance, and in the course of a few centuries it became defiled by a mass of superstitious beliefs and unworthy practices based upon them. In the encounter also of its missionaries with the

established beliefs of the nations among whom they laboured they found some forms of idolatry too strong to be readily overcome, and these they endeavoured to transform and incorporate with their own system. The full history of the various changes through which the system passed has not yet been written, and it will be a long time before the materials necessary for such a history are available for the use of European scholars. Sufficient has been learned, however, to show that in the early part of the seventh century of the Christian era, just about the time that Mohammed was beginning his public career in Arabia, Srong Tsau Gampo, one of the rulers of Tibet, sought to introduce the system of Buddhism to his country. Aided by his two queens, who were ardent Buddhists, the king established monasteries, schools, and colleges for religious instruction, and induced many teachers from India to stay in his dominions. He also caused the sacred books of Buddhism to be collected and translated, and endeavoured by all means in his power to establish the new religion. Unhappily, it was not the pure ethical system of Gautama Buddha that was introduced, but a mingling of Sivaism, Shamanism, and Buddhism, and after the death of the king the new system decayed, and was by subsequent rulers almost suppressed. It never lost its influence altogether, however, and during the next three centuries, which were marked by much civil war and internal discord, it gradually increased its hold upon the people, until in the eleventh century it became firmly established as the national religion, and its leading officials became possessed of the chief temporal power in addition to their spiritual influence. They were confirmed in the possession of both by the Mongol emperor KU BLAI KHAN, who introduced Tibetan Buddhism to China, and from that time until the present the religious head of the system in Tibet has also been the chief secular ruler, the Emperor of China being acknowledged as suzerain. In the fourteenth century, however, the established system was rudely challenged by a reforming monk named Tsongkapa, born about 1357, who was led, by an earnest study of the Buddhist scriptures, to reject many of the additions of later times, and to demand a return to an earlier and purer form of the faith. His public ministry began about 1390, and his followers soon became very numerous. As he commanded them to wear the yellow robe which had been introduced by Gautama they were nicknamed *yellow-caps*, the monks who adhered to the old system being distinguished by hoods of a red colour. Unlike Protestantism in Christianity, the reformed doctrine of Buddhism increased in its influence until it superseded the old, and in the middle of the fifteenth century the leaders of the new sect were accepted by the Chinese government as the heads of the church and tributary rulers of the country. Subsequent changes have been merely developments of the doctrine and discipline thus established, no vital change or transformation having taken place since.

In the account given in this work of the doctrines of Buddhism, it has been pointed out that the central idea of that system is the attainment of Nirvana, but in the system of Lamaism this conception has given way to another which has been termed Bodhisatship. Both are founded upon the Oriental belief in the transmigration of souls, but while Nirvana represents the attainment of endless and unbroken repose, Bodhisatship aims at the return to the earth as a Buddha, with a fresh message of enlightenment rendered necessary by the spread of ignorance and corruption among men. To reach this exalted state it would be necessary to strive after sanctity throughout many hundreds of different births; hence any man who became remarkable for piety and learning was looked upon as the incarnate existence of a departed saint, and honoured accordingly. Among these saints two were regarded as being pre-eminent, inasmuch as they were heavenly beings, who became incarnate during the mission of Buddha, in

order that they might attain to a similar honour at a future period, and it is their spirits which are believed to become incarnated in the heads of the church, the two grand lamas. These are known as the Dalai-lama (sea priest, i.e. a priest as wide as the sea) and the Pantshen-lama, officially known as *Pantshen Rinpoche* (precious teacher). The former of these resides at a great monastery near the city of Lhasa, the capital of Tibet, and is politically supreme, though the other, who resides at Krashtis Lumpo in Further Tibet, is of equal ecclesiastical authority. When one of these dignitaries dies, it is the duty of the other to determine the child into whom the departed spirit of his colleague has passed, and an elaborate ceremonial is employed in connection with this interesting event. It is believed, however, that the real choice is left with the Emperor of China, and that he secretly nominates each successor to the office. Next in rank to the grand lamas there are a large number of the heads of the greater monasteries, known as *Khutuktus*, who are regarded as being also incarnate saints, and who occupy a position in the hierarchy very much resembling that occupied by the cardinals in the Roman Catholic Church. Under these are the *Khubilghans*, also reckoned incarnations, who preside over smaller monasteries and who are very numerous. These represent the higher orders of the clergy and are chosen from among the children of privileged families, but there are in addition several ranks of lower clergy, corresponding to some extent to the deacon, priest, dean, and doctor of divinity in the Episcopal churches, who obtain their position on the principle of merit and ecclesiastical learning. All the members of the clergy take the vow of celibacy, and most of them live in monasteries.

The public worship of Lamaism is conducted with much ceremony and observance of ritual. Adoration is paid to many mystic beings, deities, canonized saints, past and incipient Buddhas, &c., and their worship is carried on by means of prayers, hymns, the repeating of the sacred texts, and the use of musical instruments. No animal sacrifices are allowed, but the faithful make offerings of milk, butter, flour, tea, and other articles. Three great festivals are observed: the New Year feast, observed in February, which lasts fifteen days; a feast in memory of the incarnation of Gautama Buddha, held at the commencement of summer; and the water feast, which marks the commencement of autumn, and is held in August and September. In addition to the performance of their religious functions the monks undertake the duties of scribes, physicians, and fortune-tellers, and their presence is required in connection with most of the more important events of life. The clergy taken altogether are said to be so numerous that they make up a third of the population.

The sacred books of this system are of a very voluminous character, the great collection called the *Kandjur* alone comprising 689 separate works, and extending to about 199 volumes folio. Some of these works are translations of older Sanskrit writings, while others are the work of Tibetan writers. There is also a mass of theological literature entitled the "*bas Tan gjur*," which extends to over 200 volumes folio, but which, unlike the former collection, does not possess canonical authority.

Unlike some of the other religious systems of the East, the religious books of Lamaism offer very little that is instructive or useful to European scholars, but the study and investigation of the growth of its ecclesiastical system is full of interest and value. From the earliest times travellers to Tibet have been delighted to trace an analogy between the system of Lamaism and the Roman Catholic Church. The first Jesuit missionaries who penetrated to this country were so struck with the resemblance that they propounded the theory that the founder of Lamaism must have been instructed by a Christian, while other early investigators of a different turn of mind regarded Lamaism

as a most ingenious Satanic device to use the methods of the Catholic Church for his own purposes. "In the practices of this system it is said there are to be found observances corresponding to the sacraments of baptism, confirmation, and penance; that all the orders of the church, from the novice and deacon up to the Pope, are to be found there; while the Western conception of one supreme spiritual and temporal ruler and a whole people under the guidance and rule of the church, is in Tibet practically realized. It is, however, certain that the Tibetan Buddhists have worked out their own system without any aid from the establishment of Christianity, and consequently the history and practice of Lamaism are of peculiar interest and value to the students of the new science of comparative theology.

(See Huc and Gabet, "*Souvenirs d'un Voyage dans la Tartarie, le Tibet, et la Chine*," Paris, 1858; "*Die Lamaische Hierarchie und Kirche*," von Karl Friedrich Koepfen, Berlin, 1859; and Babu Sarat Chunder Das's "*Contributions to the Religion and History of Tibet*" in the *Journal of the Bengal Asiatic Society*, 1881.)

LAMARCK, JEAN BAPTISTE PIERRE ANTOINE DE MONET, CHEVALIER DE, an eminent French naturalist, was born 1st August, 1744, at Bazantin, in Picardy. He was designed by his father for the church, but at the age of seventeen he entered the army. An accident, resulting from a practical joke, caused him to retire, and he obtained a situation as clerk to a banker in Paris, spending his leisure in the study of science. In 1778 he published his "*Flore Française*," which led to his being elected a member of the Academy of Sciences. In 1781 and 1782 he travelled through Europe as botanist to the King of France, making some extensive studies in botany, the results of which he published in the "*Encyclopédie Méthodique*." In 1788 he was appointed assistant at the Jardin du Roi, and 1793 to a zoological chair in the reorganized institution. His department was the lower forms of animal life, for which he introduced the term *Invertebrata*. He had hardly studied the subject when he received his appointment, but he devoted himself to it with so much zeal and industry that in a few years he was able to publish his "*Histoire Naturelle des Animaux sans Vertèbres*" (seven vols., Paris, 1815-22), a work which entitles him to take his place in the first rank of zoologists. In 1818 he resigned his post at the Jardin des Plantes, an infirmity of vision induced by small-pox having ended in complete blindness; but he still continued his studies, aided by his eldest daughter and M. Latreille, and produced some valuable works. His last years were spent in very reduced circumstances, and he died after a prolonged illness at Paris in 1829. In addition to the works already mentioned, Lamarck was the author of some books on chemistry of but little value, and of an important production, entitled "*Philosophie Zoologique* (two vols., 1809), in which he propounded some theories concerning the progressive development of living beings, which resemble in many important respects the later speculations of Darwin.

LAMARTINE, ALPHONSE DE, a remarkable French poet, orator, and politician, was born at Mâcon, in Burgundy, 21st October, 1791. He had descended from a family which suffered much during the Reign of Terror. After a very irregular education, he entered the army in 1814, but speedily quitted it. In 1820 his "*Méditations Poétiques*" appeared, and rapidly excited admiration for the new and original style it introduced into the lyric poetry of France. The government recompensed Lamartine by appointing him secretary of embassy to Naples, where he met the young English lady, Miss Birch, who soon became his wife. He was afterwards sent to London in the same capacity, and thence transferred to Florence as *chargé d'affaires*. In 1823 appeared his "*Nouvelles Méditations*," and his "*Harmonies Poétiques et Religieuses*" (1829) led to his being elected a member of the French

Academy. In 1832 he set out on a journey to the East, accompanied by his wife and only child—a daughter sixteen years of age, whom he had the misfortune to lose at Beyrout. The fruit of his travels was a valueless work on the East, in imitation of Chateaubriand. During his absence he had been named deputy for Dunkirk. His first essay as a parliamentary speaker was a decided failure. In 1835 he produced his poem of "Jocelyn," and two years later appeared "La Chute d'un Ange." In 1839 he published his "Recueils Poétiques," as the farewell of the poet to the muse. In 1847 he published his "Histoire des Girondins," full of historical inaccuracies as usual with him, but written in the most attractive style. In this work he threw a sort of poetical halo round the actors in the most sanguinary events of the Revolution. The work proved immensely popular, and parts of it were dramatized. The revolution of 1848 drew near, and when it burst and culminated in the flight of Louis Philippe, the popular voice called upon Lamartine to form part of the provisional government, which proclaimed the Republic anew, February, 1848. This was the greatest moment of his life; the name of Lamartine was regarded by the country at large as the symbol of order and moderation. During the confusion which followed, it was his eloquence that for several days protected the Hôtel de Ville when the provisional government was installed; and his courage, presence of mind, and energy saved Paris. There was a moment when he might easily have assumed the dictatorship; but his influence was of short continuance. The insurrection of June overthrew him and his colleagues, and at the general elections for the Legislative Assembly he was not returned. The *coup d'état* of the prince president (Napoleon III.) in 1851 put an end to Lamartine's career in public, and he retired into private life.

His latter years were devoted to what has been well called the "travaux forcés" of literature, necessitated by the wreck of his fortune through extravagance. He continued to send forth, fortnight after fortnight, his "Entretiens," and thus consumed in ephemeral productions the energies which he might have concentrated on the composition of a work more worthy of his fame. Offers of pecuniary assistance were more than once conveyed to him in the most delicate form by Napoleon III., but were declined. About two years before his death a bill was presented by the government to the Legislative Chamber for an annuity of 25,000 francs to be paid out of the public funds, which was voted, and in this form relief was accepted by Lamartine. He died at Paris 1st March, 1869.

LAMB, CHARLES, essayist, critic, and poet, was born 10th February, 1775, in Crown Office Row, Inner Temple, London. He was educated at Christ's Hospital, where he had for a schoolfellow Samuel Taylor Coleridge, and in 1792 he became a clerk in the accountant's office of the East India Company. In 1796 a terrible calamity fell upon him in the death of his mother, who was killed by his only sister, Mary Lamb, during a fit of insanity. When his sister's health returned, as it did shortly afterwards, Charles resolved to make her welfare the object of his life. He was at this time in love with a young lady named Alice Winterton, but he resigned all thoughts of marriage, and took up his abode with his sister, whom he tenderly cared for until his death.

Lamb's first appearance as an author was made in 1796, when he contributed a few sonnets to a volume of "Poems on Various Subjects" published by Coleridge, and in 1797 he contributed a few poems to a volume which contained also the productions of Coleridge and Charles Lloyd. These efforts in verse attracted but little attention, but in 1798 a short prose tale entitled "Rosamund Gray" was more successful. In 1801 he published a tragedy entitled "John Woodvil," which was never acted and which was severely handled by the Edinburgh reviewers. In 1806 he

made another attempt in the direction of the drama, and a farce written by him, entitled "Mr. H.," was produced, but it was condemned the first night—Lamb, who was in the pit, joining heartily in the hissing. The following year there appeared the well-known "Tales founded on the Plays of Shakspeare," by Charles and Mary Lamb, and in 1807 he published "Specimens from Dramatic Poets contemporary with Shakspeare," and "Adventures of Ulysses." In 1808 he also aided his sister in the production of a volume of short school-girl tales entitled "Mrs. Leicester's School," and a volume of verse entitled "Poetry for Children." The latter for many years was supposed to be altogether lost to the literary world, but in 1877 a stray copy was discovered in the colony of South Australia. In 1810 Leigh Hunt started a short-lived magazine called the *Reflector*, to which Lamb contributed some excellent critical essays; but it was not until the establishment of the *London Magazine*, in 1820, that he displayed his full powers in the inimitable "Essays of Elia." In 1825, after thirty-three years' service, he was permitted to retire from the India House with a pension of £150, and he looked forward with many pleasant anticipations to a period of lettered ease and comfort. Unhappily these anticipations were not realized. He missed sadly the steady routine to which he had been so long accustomed, the health of his sister became yearly more precarious, and his own health declined. He occupied himself fitfully with literary work, contributed to some of the annuals and magazines, and published his "Album Verses" in 1830, and the "Last Essays of Elia" in 1833. He died somewhat suddenly of erysipelas, 27th December, 1834, in the sixtieth year of his age. His sister survived until 1817.

The "Essays of Elia" will ever be cherished among the treasures of English literature. In these Lamb reflects every mood and touches every chord of feeling with a master hand. He exhibits by turns wit, humour, fun, quaintness, pathos, and varied fancy; and mingled with all is constantly seen the kindly, loving, honest, enjoying nature of the writer. During his lifetime he enjoyed the friendship of some of the most eminent of his literary contemporaries, and his letters to Colbridge, Southey, Wordsworth, Bernard, Barton, Procter, and others, are among the happiest specimens of epistolary composition in the language.

The "Letters" of Charles Lamb, with a sketch of his life, were published by Sir Thomas Noon Talford in 1837, in two vols., and the same editor issued a volume of "Final Memorials" in 1848, after the death of Mary Lamb. A beautiful "Memoir" was written by B. W. Procter (Barry Cornwall), and published in 1866, and a valuable and interesting biography by Alfred Ainger was published in the English Men of Letters Series in 1882. The complete works of Lamb have been several times published, one of the best editions being that of Fitzgerald (six vols. 1870-76).

LAMBALLE, MARIE THÉRÈSE LOUISE DE SAVOIE-CARIGNAN, PRINCESSE DE, one of the more celebrated victims of the French Revolution, was a daughter of a princely house, and was born at Turin, 8th September, 1749. In 1767 she was married to the French Prince of Lamballe, who died soon afterwards from unrestrained indulgence in vice. After his death an attempt was made to arrange a marriage between her and Louis XV., but she left the court and attached herself to Marie Antoinette, who had just been married to the dauphin. After the accession of the latter to the throne the beautiful and accomplished Princess de Lamballe was made superintendent of the royal household, and became the closest counsellor and confidant of the queen. She helped to plan the flight of the king and queen, and after seeing them safely off to Germany (as she hoped) started herself for England. She, as sensible as she was beautiful, made good her escape; they, utterly helpless in maintaining their disguise, were taken, as all men know, at Varennes, when

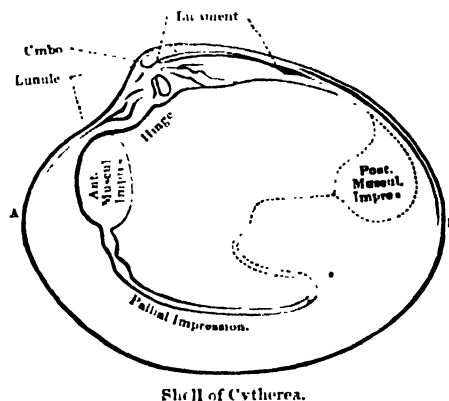
a very little manly resolution on the part of the king would have saved them. So soon as the courageous lady learned her royal mistress was brought back to Paris a captive, though nominally still a queen, she returned to France, and in that miserable attempt of the royal family to outwardly "accept the constitution" and what not, and secretly to plot and intrigue, hoping by such means to regain their former absolute sovereignty, Madame de Lamballe was among the foremost. How miserably it all ended, and must inevitably have ended, is but too deeply impressed upon the mind of everyone. When the people went wild with rage, urged on, in addition to their own bloodthirsty fury, by the faithlessness of the royalists and the impossibility of dealing with these people, as we must now sorrowfully admit, the princess was proud to share the imprisonment of the queen for a time in the Temple. She was afterwards separately confined in the prison of La Force, and on the fearful fatal night of the 3rd September, 1792, was awaked from sleep, dragged before the revolutionary tribunal which some ruffians unknown had dared to set up in the courtyard of the prison, and charged with a participation in royalist plots. After a brief examination she was ordered to take the oath of liberty and equality, and of hatred to the king and queen. The last she refused to take, and in consequence was ordered "to the Abbaye"—the signal for her being thrust through the gate of the prison to be seized by the howling mob in the street beyond, by whom she was butchered under circumstances of unutterable brutality. Her head, mounted on a pike, was carried in procession through the streets of Paris and waved before the windows of the Temple prison where the royal family were confined. "Look out," said the municipal officer on duty to the queen. "Do not look," whispered one more merciful. The faithful valet saw the fair head scarcely yet pale, and bearing its long beautiful curls; and afterwards broke the news gently to his royal mistress. A thousand and eighty-nine royalists were butchered in this massacre at the various prisons. The fate of the Princess de Lamballe is one of the most tragical episodes of the French Revolution.

LAMBERT, JOHN, an English parliamentary general, was born in 1619 at Kirkby Malham, in Yorkshire, and was educated for the bar. On the breaking out of the contest between the King and the Parliament he joined the Parliamentary army, and held the rank of colonel at the battle of Marston Moor (2nd of July, 1644). After distinguishing himself under Cromwell at Naseby, in Scotland, at Worcester, and on other occasions, and rising to the rank of major-general, the appointment of Fleetwood to the chief command of the forces in Ireland produced an alienation between Lambert and Cromwell which was never wholly healed, although he was one of the officers whom Cromwell summoned in June, 1653, and was appointed in May, 1655, by the Protector one of his eleven major-generals. He entered, however, into so many army intrigues that Cromwell had to dismiss him. But he did so in a generous way, pensioning him with £2000 a year, a very handsome sum in those days. Whence arose a new verb, by way of jest, much relished at the time: such gilded punishment was called a *lambertising*. After the death of Cromwell Lambert became the soul of the confederacy of discontented officers which was formed against the new protector, Richard. [See CROMWELL, RICHARD.] On the breaking out of the Royalist insurrection in July, 1659, he was sent by the Rump Parliament to suppress it; but immediately after his success he turned round upon the Parliament, and on its resistance to his demands dispersed it on 13th October. At the beginning of January, 1660, having been deserted by the force with which he had set out for the north to encounter Monk, he was seized by orders of the restored Parliament and committed to the Tower. On the 9th of April following

he made his escape from confinement; but the activity of Colonel Ingoldsby recaptured him at Daventry on the 22nd of the same month. He was eventually banished to the island of Guernsey, where he lived until 1694.

LAMELLIBRANCHIATA is a class of the sub-kingdom MOLLUSCA, of which the oysters, clams, and mussels are familiar examples. These molluscs are all aquatic, and, with a few exceptions, are all confined to the sea, being found on every coast and in every climate, ranging from low-water mark to a depth of 200 fathoms.

The shell (see cut) of the Lamellibranchiata is composed of two valves, which are sometimes of unequal size; hence these molluscs are often called Bivalves. The shell is, however, in reality single, as the development of such a form as the oyster proves. The two valves are united by the *ligament*, which is composed of a horny cuticular substance that has remained uncalcified; they articulate by means of the hinge (*cardo*), which is often provided with teeth. The valves of the shell can be closed by the action of powerful *adductor* muscles, of which there are usually two present; the oyster and its allies have only one. These muscles



A. Anterior or oral extremity P. Posterior or anal extremity

leave well-marked impressions on the inside of the shell. Between them runs an unbroken line, the *pallial impression*, which is the point of attachment of the animal's mantle; in the forms which have retractile siphons, this impression is deeply indented.

The Lamellibranchiata are headless molluscs, having a laterally compressed body, inclosed in a well-developed mantle. A pair of large lamellar gills are present on each side of the body; on each side of the mouth are a pair of leathlike lobes, the labial palps. The free edges of the mantle tend to fuse in the middle line below the ventral surface of the body. In the oysters, mussels, &c., the mantle-lobes are free all along the ventral surface, and at the hinder end of the body they form two slight indentations, the lower of which is fringed with numerous tentacles. When the mantle-lobes are closely applied one to another, the notches of each lobe, fitting together, form two slit-like openings, the lower of which, with a slightly gaping shell, serves for the admission of water for the purposes of respiration and nutrition, and the upper forms a cloacal aperture. In other forms the edges of the mantle fuse in the middle ventral line, leaving anteriorly an opening for the exit of the foot, and posteriorly a single opening, which includes in itself both the inhalant and exhalant orifices, which become separated from one another internally by a thick muscular wall. The mantle further becomes drawn out round these orifices, so that two tubes or *siphons* (see cut) project out of the shell, into which they can usually be withdrawn at the will of the animal. The two siphons often fuse into one tube, but the canals within their openings always remain

separate. The foot is very small or even absent in such forms as the oysters, which are permanently fixed to rocks, &c. Usually it is a large hatchet-shaped organ, which can be protruded between the valves, and used for locomotion and burrowing in the sand. In *Nucula* and some other forms it is deeply cleft, and can be expanded into a creeping disc like a snail's foot. The cockle has a large sickle-shaped foot, by which it is able to make a succession of leaps. Other forms have a strong cylindrical foot, with which they bore into the sand, or even into wood (*Teredo*) and hard rock (*Pholas*, &c.). Some lamellibranchiata progress by



Venus verrucosa.

successive flappings of the expanded valves; others by rapidly retracting the foot and ejecting water through the siphons. At the base of the foot in many species, as the mussel and Pinna, there is rooted a bundle of fibres called the *bysus*, by means of which the animals moor themselves to stones or rocks. See BYSSUS.

The lamellibranchiata feed on the particles of food, animal or vegetable, carried with the water into the lower siphon. The food-particles are carried along the gills to the ciliated labial palps, and thence into the mouth, which has no jaws or lingual ribbon. The mouth leads into a short oesophagus, which widens into a spherical stomach, from which is given off a blind sac or *cæcum*. Within this cæcum, or sometimes in the alimentary canal itself, is found a rod-like transparent body, called the *crystalline style*, which is probably an excretion product. The intestine is long and much coiled, running down into the region of the foot, and terminating dorsally at the hinder end of the body in the anus, which discharges into the cloacal chamber. The liver is extensive, and surrounds the first part of the intestine. The generative glands are packed in the foot amidst the coils of intestine: they open right and left near the base of the foot. The heart is situated in a pericardial chamber, and lies in the dorsal line slightly in front of the posterior adductor muscle. It is composed of a ventricle and two auricles. The arteries lead into spaces or *lacunæ* in the interspaces of the body. The renal organs (known in this class as the *organs of Bojanus*, from their discoverer) are paired, and open to the exterior and internally into the pericardium. The nervous system is simple. There are a pair of small cerebral ganglia lying one on each side of the mouth, and connected by cords with a pair of ganglia (pedal) in the foot, and with another pair which lie beneath the posterior adductor muscle. The free edges of the mantle are often fringed with numerous tentacles, which in some genera (*Pecten*, *Cardium*, &c.) have been modified into highly organized eyes. A pair of auditory organs, the *otocysts*, are attached to the pedal ganglia.

With few exceptions the sexes are distinct. The Common Oyster (*Ostrea edulis*) is hermaphrodite, but the generative organs are not ripe at the same time, so that self-fertilization is impossible. The eggs are usually fertilized in the mantle of the female. A few of this class are viviparous. The eggs pass into the space between the two lamellæ of the outer gill-plate, which becomes enormously distended, forming peculiar brood-pouches, within which the eggs are hatched and the young undergo the early stages of develop-

ment. Many of this order pass through the typical molluscan development from the egg, presenting a ciliated Trochosphere larva, which becomes a Veliger. In the freshwater mussels (*Unionidæ*) the development is usually direct. The Lamellibranchiata may be divided into two orders according to the presence or absence of siphons.

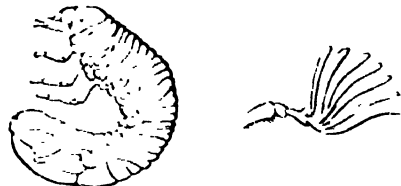
The Asiphoniata (Plate I.) have the inhalant and exhalant orifices formed by mere notches in the mantle-lobes, which are free along the ventral surface. Many of this order have lost the power of locomotion, the foot being very small or wanting. The following are the principal families in the Asiphoniata:—Arcadæ (Plate I. figs. 1, 2), Trigonidæ (fig. 3), Mytilidæ, containing the common sea-mussels (*Mytilus*, fig. 4); Unionidæ (figs. 5-7), the freshwater mussels, of which the Swan-mussel (*Anodonta cygnea*, fig. 5) is found in English ponds; Aviculidæ, containing the Pearl-oyster (*Melagrina margaritifera*, fig. 8); Pinnidæ (fig. 9); Ostreidæ or Oysters (figs. 10, 11); Pectinidæ, containing the Scallop (*Pecten*, fig. 12); and Limidæ (fig. 13). The Siphoniata (Plate II.) have the edges of the mantle more or less united and drawn out at the hinder end into siphons. The principal families in this order are:—Chamidæ (Plate II., figs. 14, 15); Cardiidæ, containing the Cockle (*Cardium*, fig. 16); Solemydæ (fig. 17); Lucinidæ (fig. 18); Cyprinidæ; Veneridæ (fig. 19); Tellinidæ (fig. 20); Mactridæ (fig. 21); Myidæ (fig. 22); Gastrochænidæ, containing the Watering-pot Shell (*Aspergillum*, fig. 23); Anatinidæ; Solemidæ, containing the Razor-Shell (*Solen*, fig. 24); and Pholadidæ, containing the Piddock (*Pholas*, fig. 25) and the Ship-worm (*Teredo*).

LAMELLICORNIA is a group of beetles belonging to the section PENTAMIRA, and containing two great families, SCARABIDÆ (Dung-beetles, Cock-chafers, Rose-chafers, &c.) and Lucanidæ (STAG-BEETLES). The group derives



Biphyllocera kirbyana.

a, male; b, female.



Cockchafer (*Melolontha vulgaris*).

Larva and antenna of male.

its name from the terminal points of the antennæ forming a lamellated club. In the Scarabidæ three or more terminal joints of the antennæ are elongated on one side into leaf-like processes, which lie over one another like the pieces of a fan, and have the same power of separate movement. In the stag-beetles the last joints of the

antennæ are similarly elongated on one side, forming a deeply notched club, but they are immovable. The legs are strong and spinous, the tibiæ of the fore pair being toothed. The males in many of the species are armed on the head and thorax with horns, or have the jaws much developed. Excepting among the Longicorn beetles, larger and more bulky species are nowhere else to be found among the Coleoptera. Their larvæ are thick and fleshy, and have the end of the body curved towards the breast, so that the grub has to lie on its side. The larvæ have a horny head furnished with stout jaws. They feed chiefly on vegetable substances, living or decayed; some in the larval as well as in the mature state are dung-feeders. In nearly every case the larva forms an oval chamber in the soil in which it undergoes the change to the pupal state. The perfect insects in some cases feed on flowers and leaves; others are scavengers.

LAMENNAIS, FÉLICITÉ ROBERT DE, a French priest and literary man who became a considerable power in his generation, was born at St. Malo in 1782. He took orders in 1816, having previously been a schoolmaster, and at once turned his knowledge of the literary art to the service of his new profession. He took the high ultramontane side, deriding Gallican liberty and advocating the supreme and absolute authority of the church ("Essai sur l'Indifférence en matière de Religion," 1817). His works brought him at once to the front. Neither friend nor foe could overlook their power. Accordingly, when a party arose which advocated liberal political ideas with ultramontanism in religious views, Lamennais was selected as its leader, and became the editor of several journals, each in turn suppressed, the *Avenir* alone surviving. In this Lamennais found himself carried on by the tide of liberal feeling in France to disapproval of the temporal government of the Roman papal court, while he still as fervently as ever defended the absolute authority of the Pope in matters of religion. But orthodoxy in the one thing did not save him from the consequences of his heterodoxy in the other. In 1832 the Pope (Gregory XVI.) censured the *Avenir* in an encyclical, in terms so wounding to Lamennais as to cause an entire breach with Roman policy. By 1834 the divergence was so great as to produce the defiant "Paroles d'un Croyant" (Words of a Believer), a work in which the writer's earlier opinions on church matters were exactly reversed. As ardently as he had advocated ultramontanism, so now did he advocate the greatest liberty—one might almost say license—of thought on religious subjects. He began life under the Empire as a Catholic royalist, he ended it under the restored Monarchy as a theistic (or atheistic) republican. But in spite of this extraordinary career, those who care to look into Lamennais' works are rewarded by the enjoyment of a style intensely personal and original. Especially in the "Paroles d'un Croyant" is his mystic, prophetic, gorgeously coloured, abrupt, and broken declamation attractive almost to fascination. His influence is most perceptible upon the weaker side of Victor Hugo. Had Lamennais never written probably Hugo would have been a greater man. Lamennais died in 1854.

LAMENTATIONS, BOOK OF. In the Hebrew Bibles this book bears the superscription "Ah how," or the two first words of the opening portion. It forms one of the five "Megilloth" (or Rolls), and is read by the Jews on the ninth of Ab, the day on which the first temple was destroyed. In the Talmud it is spoken of as the book of "Dirges," a term equivalent to our own "Lamentations." The authorship of the book was until a recent period universally ascribed both by Jews and Christians to the prophet Jeremiah, and though this tradition has been called in question by some modern critics, who find many evidences for a distinct authorship and date of each of its five parts, it is still supported by many competent scholars.

The book consists of five distinct dirges, composed in reference to the fall of Jerusalem and the overthrow of the kingdom of Judah by the Chaldeans. The first four of these are acrostic poems, chapters i. ii. and iv. having each twenty-two verses beginning with successive letters of the alphabet, and chapter iii. having sixty-six verses, three under each letter. The fifth chapter has twenty-two verses, but they are without alphabetical order. In the first chapter the letters follow the common order of the Hebrew alphabet, but the others have a slightly different arrangement of the letters.

In the first of these dirges the writer dwells upon the misery and distress of Jerusalem, under the symbol of a widowed princess who had been brought into dishonour and shame. In the second the horrors of the siege are depicted with terrible intensity, and connected with the sin that had caused them—a complaint being made unto Jehovah. In the third chapter we have either a personal complaint of an individual Israelite, or what is more likely, a description of the affliction of the nation under the symbol of an individual. The fourth dirge repeats the story of the awful sufferings entailed upon the people by the siege of Jerusalem, mentions the capture of its king, and intimates that the cup of suffering had now been drained to its dregs, and that it would pass from the people of Jehovah to their enemies. The concluding chapter takes the form of a prayer to Jehovah, and seems to refer to a later period of the captivity, when the people were enslaved and compelled to serve their conquerors.

The whole of the dirges are marked by a feeling of penitence and submission; sin is acknowledged as the cause of the suffering, but notwithstanding this an appeal is made to Jehovah, and confidence is expressed in the return of his love. The book affords us a glimpse of the conditions of suffering and misery which attended the wars, sieges, and marchings into slavery which occupy so large a space in ancient history, while its expressions of penitential sorrow have been used by Jews and Christians to express personal as well as national or general emotion. The annual use of this book by the Jews has already been referred to, and it enters largely into the services appointed by the Latin Church for Passion week.

On the Thursday, Friday, and Saturday of Holy Week the first three lessons in the Roman Catholic Church for the office called *Tenebræ* are taken from the Lamentations of Jeremiah. At Rome itself, at St. Peter's, St. John's Lateran, and some other churches, the most exquisite music is performed, of great antiquity, and with traditional effects in performance which cannot elsewhere be successfully imitated. There are nine lamentations, three on each day, and Palestrina set the whole nine thrice. The first work he produced in this connection was the marvellously lovely first lesson for Good Friday, which he wrote singly in 1587, and which is now always used. The admiration this piece excited at Rome led to his writing music for the rest in sets. One of his sets is used for Thursday, and a very fine set by Allegri is used on Saturday, in which the later composer has caught Palestrina's magnificently solemn style to a very great extent.

LA'MIA, a fabulous monster among the Greeks, a fiction to frighten children with. A Lamia or Empousa sucked the blood of her victims from the bitten throat, like a vampire, the Greek word for throat being *laimos*. To entice them into her power the demon would assume the form of a lovely maiden of surpassing attractiveness, so that youths sacrificed all to marry her. Goethe's "Bride of Corinth" is founded on this fable; and Keats' "Lamia" has a still more etherialized version of the underlying sentiment of the ancient superstition.

LAM'INA SPIRAL'IS. See *EAR*.

LAMINATION is the minute stratification that occurs in fine slates and shales. It generally produces a fissile

structure that is conformable to the bedding. Lamination is to be carefully distinguished from slaty-cleavage. Cleavage is a superinduced structure; lamination is produced by the deposition of very fine material differing slightly in structure.

LAMMERGEIER (*Gypaetus barbatus*) or Bearded Eagle, is a large bird of prey, somewhat intermediate between the vultures and eagles both in structure and habits. The head and neck are clothed with feathers, as are also the short tarsi. The beak is strong, compressed, and greatly hooked, and the claws are stronger and more curved than in the vultures; both, however, are weak as compared with those of the eagles. This bird may be readily distinguished from others of its kind by the presence of a singular beard-like tuft of stiff bristles under the lower mandible, and of a patch of similar bristles covering the base of the upper mandible on each side, and concealing both the cere and the oval oblique nostrils which are pierced in it. The sclerotic of the eye is bright red. The lammergeier is one of the largest birds of prey, attaining a length of from 43 to 46 inches, of which 20 are taken up by the long wedge-shaped tail; its outspread wings measure as much as 9 feet in expanse. The plumage of the upper part of the body is of a dull brown colour, mixed with gray; the wings and tail are dark gray; the under surface is whitish, more or less tinged with orange; and the head is dirty white, with a black band encircling the eye. The claws and the bristles of the beard and face are black. The lammergeier is subject to variations of colour in different regions, a fact which has been held by some sufficient to justify the creation of several distinct species.

The lammergeier inhabits the mountainous regions of Southern Europe and Asia from Portugal to the borders of China; it is also found in some parts of North Africa. In Europe it is almost confined to the countries fringing the Mediterranean, as Crete, Greece, Sicily, Sardinia, Spain, and Portugal; it is found in the Italian Alps, but is nearly extinct in Switzerland; it is most abundant in Spain. It is common in the Himalayas. Great difference of opinion exists as to the habits of this bird, some asserting that it lives entirely on carrion like a vulture, while others maintain that it agrees with most eagles in preferring living food. It is probable that its habits vary considerably in different localities. In the Alps it seems to prey largely on living animals, such as rabbits, lambs, kids, &c.; its name lammergeier (lamb-vulture) indicates the suspicions of the Alpine shepherds. It is also said sometimes to attack the chamois, or even man himself; but when attempting any such doubtful enterprise as this it waits until its intended victim is close to a precipice, and then descending upon it with irresistible velocity, sweeps it into the abyss below. Both in Europe and India stories are current of children having been carried off by the lammergeier, but these want confirmation. In the latter country the habits of the bird approach more nearly to those of the ordinary vultures than appears to be the case in Europe; and they come in flocks to devour carrion of all sorts without the least regard to the presence of man. A peculiarity of this bird is its fondness for bones; if it cannot get the marrow out by other means, it soars up into the air with the bone and drops it on a stone. This is the bird which is called *ossifrage* (bone-breaker) in the Bible. It is said to employ a similar method in order to feed on tortoises; if the legend about the death of Æschylus be true, he was killed by this bird dropping a tortoise on his bald head in mistake for a stone.

The lammergeier builds a large nest of sticks on a ledge of rock, often in the most inaccessible situations. The same spot is often occupied for several years in succession. It lays a single large egg of a pale brownish-orange colour.

The Southern Lammergeier (*Gypaetus nudipes*), found in Abyssinia and the more southern parts of Africa, is usually regarded as a distinct species. It differs in having the lower part of the tarsi bare of feathers, and in wanting the black stripe below the eye. In its habits it agrees with the preceding species.

LAMMERMUIR or **LAMMERMOOR HILLS**, a range of mountains in Scotland, extending from the south-eastern extremity of the county of Edinburgh, through Haddington and Berwickshire, to the North Sea. Their surface is chiefly moorland and sheep-walks, though on the lower slopes are extensive tillage farms. The geological structure of this range consists of the lower Silurian or graywacke beds, with porphyry and granite rocks. The principal summits are—Lammer Law, 1733 feet high; and Lowraus Law, 1631 feet above the sea.

LAMOTTE-FOUQUÉ, FREDERICK H. C., BARON DE, author of the famous tales "Peter Schlemihl" and "Undine," the latter one of the most felicitous creations of the story-teller's art, was born at Brandenburg, in Prussia, in 1777, and died in 1843. None of his other numerous works will at all compare with these two world-wide productions. His wife, the Baroness Caroline von Lamotte-Fouqué, was a Saxon by birth. She also wrote many romances, and devoted much of her literary work to the furtherance of the higher education of women. She died in 1831.

LAMP. A lamp in its simplest form may be defined as a vessel designed to burn oil or fat by means of a wick, but its different designs and constructions have been as varied as the purposes to which it has been applied. It has been suggested that the first lamps were made by utilizing marine shells, some of which are of an admirable shape for this purpose, and some sea shells are used at the present day in this manner, the spindle shell being thus utilized in some of the poorer cottages of Shetland. The invention of the lamp has been assigned to the Egyptians, but this is problematical, and some modern scholars are disposed to regard it as being derived, with other appliances of civilization, from Asia. Herodotus describes a festival of

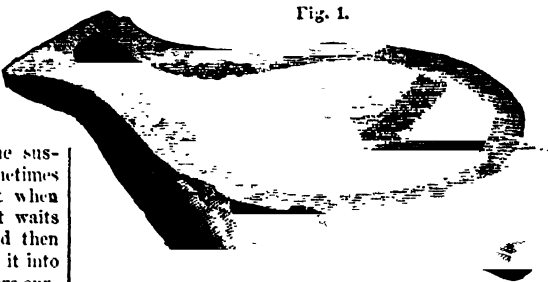


FIG. 1.

Earthen Lamp found in Etruscan workings at Monte Valerio in Tuscany.

lamps which was held at Sais in Egypt, and he notices the immense number employed, but does not refer to the lamp as being a novelty. A similar custom is still celebrated with great magnificence among the Chinese, by whom it is called the Feast of Lanterns. Lamps were used from a very early period by the Jews, and they are frequently referred to in the Old Testament. The construction of a lamp-stand with seven branches is assigned to the time of the wilderness sojourn, and we find hand-lamps used by Gideon to effect a night surprise during the period of the judges. A small lamp burning olive oil seems to have formed part of the furniture of every household, and as this was kept burning all night, the putting out of the light is often used as a sym-

bol of the ruin and extinction of a family. The term lamp is also used in the Scriptures to denote a kind of torch, made by pressing strips of cotton or linen cloth into a cup provided with a long handle, and moistening them with oil, which was carried in a separate vessel. In the parable of the ten virgins the lamps referred to are evidently of this description, and similar lamps are still used in the East.

In the early ages of Greece and Rome the lamps were of a very simple construction, the material used being chiefly terra-cotta, of the shapes shown in figs. 1 and 2. After-

Fig. 2.



Moorish Lamp found at the Mines of Gar-Rouban, in Algeria.

wards lamps were made of bronze, and as civilization increased more costly materials were employed, Corinthian brass, silver, and gold being pressed into service, the ornamentation and workmanship being of a very elaborate character. Among the discoveries of Roman remains no articles are more common than lamps, and they are found of all sizes and forms, and in every kind of material. Etruscan lamps are rare, but some of those that have been found are of elaborate design and display workmanship of high character. In the excavations made at Herculaneum and Pompeii many lamps of a rich and elegant description have been discovered. In later ages we find the classical *bilychnis lucerna*, the *pharus*, and others, sometimes made of silver and sometimes in the form of a crown or cross with numerous branches.

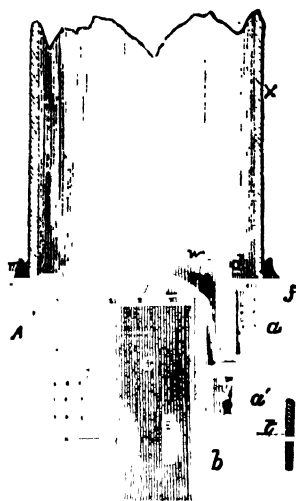
Notwithstanding the skill and ingenuity displayed in their construction, but very little was done to improve the light-giving qualities of lamps until the end of the eighteenth century. The primitive design of the sea shell was still adhered to—an oil vessel placed immediately behind the burning point of the wick, and the latter a soft round cord, being almost the only form employed. Or, as in the beautiful Moorish forms, like their slippers with long pointed toes, other shapes might be used, but the principle was that of the old Greek and Etruscan lamp. In such lamps the combustion of the oil is necessarily imperfect; a reddish smoky flame shedding light only forward and sideways, and yielding a plentiful supply of "blacks," is all that can be obtained. The first important improvement was introduced in France by Meunier in 1780, when a burner was designed having a flat band or ribbon wick and a metallic chimney; but the most valuable improvement was that introduced by ARGAND of Geneva, which was patented in England in 1783. In this form of lamp a cylindrical wick was used, placed between two metal tubes, through the inner of which a current of air was allowed to pass to the inside of the flame, in addition to that which was maintained round its outer circumference by means of a chimney, at first of metal, placed some distance above the wick, but soon after constructed of glass. This lamp afforded a white and brilliant light of much greater power than any that had been previously available, and its discovery was hailed as affording the means of pursuing many delicate kinds of work which previously had been restricted to daylight. It was, however, found in practice that the flame in the lamp varied with the change of the level of the oil in the reservoir. A form of lamp on the principle of the bird-fountain was devised by Proust about 1780. This of necessity had the

oil reservoir placed somewhat above the level of the wick and it therefore obstructed the free diffusion of the light on all sides. The Carcel or Pump Lamp was introduced to overcome this defect. In this lamp the oil is forced through a double piston or pump by means of clock-work. Properly managed, this lamp gave a steady and bright light for seven or eight hours; but it was costly and easily disarranged, and though it is still retained by Parisians as the standard for photometric investigation, it never became very common. In 1836, or thereabouts, a lamp was invented by M. Franchot, termed the Moderator, which, from its simplicity and efficiency, soon superseded most of the other forms in use. In the Moderator Lamp the oil, which is stored in the body or pillar of the lamp, is forced up on the wick by means of the pressure of a strong spiral spring on a leathern piston. The spring is wound up by means of a rack and pinion, and as it exerts the most pressure when most fully wound, the flow is regulated by means of a tapering rod placed in the ascending tube, termed the "moderator." By this arrangement

a very steady light is secured, and in its simplicity and efficiency the Moderator is one of the best forms of the mechanical lamp. Its chief drawbacks are the liability of its mechanism to get out of repair and the cost of the oil, which should be pure colza, of which a single lamp will burn 2 quarts in a week.

All the lamps hitherto described were designed to burn animal or vegetable oils, and when it was sought to utilize the mineral oils, such as paraffin and petroleum, some new designs became necessary. These liquid hydrocarbons give off inflammable vapours at comparatively low temperatures, and when used for illuminating purposes they come to the burning point in the condition of vapour. They are also lighter than the animal or vegetable oils, and require no mechanical pressure to assist the capillary attraction of the wick. When first introduced the inflammable vapours were given off at such low temperatures

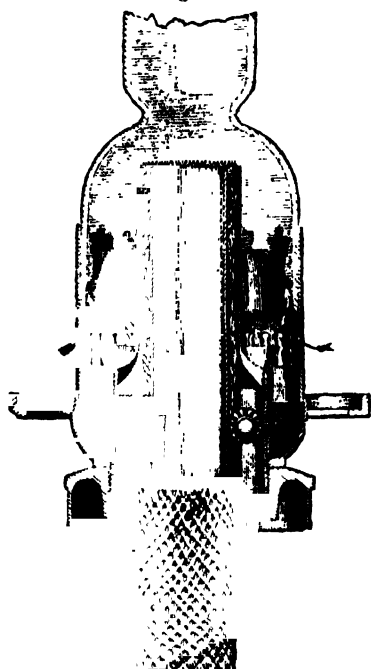
Fig. 3.



that dangerous explosions resulted, and in addition the imperfect combustion of the oil in the lamps caused a good deal of deleterious vapour to be given off during the burning. The first difficulty was overcome by improving the processes of rectification, by which the more volatile elements were got rid of, and in 1856 a lamp was designed in Germany which enabled a plentiful and constant supply of air to be secured, so as to insure the complete combus-

tion of the oil. In this lamp a flat wick was employed, shown at *c* in fig. 3, which passed in a metal tube up through a brass air chamber, *a a*, pierced with holes or slits, and communicating with the outer air. Over the top of the burner a dome-shaped cap was placed, having a slit in it rather larger than the wick tube, through which the flame passed. A long glass chimney was used to secure a strong draught of air, which, being deflected by the dome against the flame, caused a strong bright light to be produced, and insured the complete combustion of the oil. This lamp so successfully met the requirements of the oil that it rapidly passed into use, and the Paraffin Lamp is now known everywhere. In 1865 the Duplex Lamp, having two flat wicks, was introduced, and this, from the brilliancy of the light it affords, has come generally into use. Another form of the paraffin lamp, in which a broad flat wick is drawn through a hollow truncated cone, as shown in fig. 4, and caused to meet at its edges at the top, is now very largely

Fig. 4.



used. It gives all the advantages of the Argand burner with very little trouble, and a glass chimney is employed which, by a contraction just above the flame, produces the same effect as the brass dome in other lamps. A modified Argand burner has also been introduced by M. A. M. Silber for burning purified petroleum, which gives excellent results. More recently oil lamps have been utilized for heating purposes, and stoves, ovens, and sets of cooking apparatus have been designed to burn oil by means of suitable lamps. See also ELECTRIC LIGHTING, GAS LIGHTING, SAFETY LAMP.

LAMP'BLACK, a term given to a black pigment consisting of finely divided carbon, made by burning pitch or resin, with limited access of air, and collecting the soot from the flame.

LAMPE'ER or **LLANBEDR**, a town of Wales, in the county of, and 24 miles E.N.E. from Cardigan, and 270 miles from London by rail. It is situated on the Teify, and contains St. David's Royal College, for the training of candidates for the ministry of the established

church, in which Greek, Latin, and Hebrew, the English, Welsh, and modern languages and natural philosophy are taught; there are also a neat parish church, library, museum, &c. The population in 1881 was 1443.

LAMP'REY (*Petromyzontidae*) is a family of fishes of very low organization. Together with the Hags (*Myxini*) the lampreys form the group *MOXOMIINA* (or *Cyclostomata*), which by systematic zoologists is now excluded from the class *Pisces*. The lampreys have a wholly cartilaginous skeleton with a persistent notochord without a cartilaginous sheath. There are no jaws, lateral limbs, nor ribs. The mouth is circular and the nasal sac single. The body is long and eel-like, with a smooth scaleless skin. Within the circular mouth, and at the base of the tongue, are horny teeth. The lampreys can attach themselves to boats, stones, and fishes by the mouth, which acts as a powerful sucker, while their teeth rasp the flesh of their victims. The lamprey differs from the Hag (*Myxine*) in having the nasal sac entirely closed, except for the single nostril opening to the exterior dorsally. The pharynx is perforated by seven gill-slits, which lead on each side into wide sacs having apertures to the exterior. The gill-sacs are supported by a cartilaginous basket-work, which is wanting in the hags; below the perforated region the cartilage dips in and forms a diaphragm, on which the heart rests. The dorsal fin begins far back and is separated into two parts, the posterior of which in the common lampreys is continued uninterruptedly round the tail as far as the vent.

The lampreys are remarkable for undergoing a metamorphosis before reaching maturity. A curious fish, known as the sandpripe, pride, or stonegrig in England, inhabits the streams frequented by species of lampreys throughout Europe. This fish received the generic title *Ammocetes*, but is now known to be the larval form of *Petromyzon branchialis*. The ammocetes presents some resemblance to an earthworm in appearance. The eyes are small and hidden beneath the skin. The head is very small. The mouth is horseshoe-shaped and toothless; within it a valve is developed which acts as a strainer for the food, which consists of infusorians, &c. There is one continuous vertical fin. The ammocetes grows to the full size, and then in the third or fourth year of its existence develops into a lamprey without further growth, the mouth becoming suctorial and acquiring teeth, and the other changes taking place. There is little doubt that the other species of lampreys pass through a similar ammocetes condition.

The Sea Lamprey (*Petromyzon marinus*) occurs on all the coasts of Europe except those of the Black Sea; it is also found on the west coast of Africa and in North America. In the spring it enters rivers for the purpose of spawning. It is about 3 feet in length, of a greenish-brown colour, with darker markings on the sides. It attacks mackerel, cod, and flat-fishes. The lamprey has long been highly esteemed as food in England. Henry I. is said by Matthew of Paris to have died of a sudden illness occasioned by eating too plentifully of lampreys, as the poet Pope is reported to have done in more recent times; and Henry IV. is stated by Pennant, quoting from Rymer's "*Fœdera*," to have granted protections to such ships as brought over lampreys for the table of his royal consort. Henry VI. contracted with William of Nantes for a supply to his army, whithersoever it might march, of lampreys to be taken between the mouth of the Seine and Harfleur. It was anciently a custom of the city of Gloucester to present the British sovereign with a lamprey pie. In English rivers the lamprey is chiefly taken in the Severn, but is also found in the Thames.

The Lampren or River Lamprey (*Petromyzon fluviatilis*) is a smaller species, attaining a length of from 12 to 15 inches. It is taken in great numbers every year in the Thames, and sold to the Dutch fishermen for bait in the

cod and turbot fisheries. It feeds on insects, worms, and small fishes. The back is of a dark bluish tint, and the sides are silvery. It is found throughout Europe and in North America. A smaller species, the Sandpiper or Small Lamprey (*Petromyzon branchialis*), is found in the Thames, especially near Oxford. It is very similar in colour, habits, and distribution to the river lamprey. Several other species of the genus *Petromyzon* are known. The genus *Geotria* is distinguished by the possession of a large gular pouch before the gill-openings, the separation of the second dorsal fin from the caudal, and some peculiarities in the dentition. Two species of this genus are known, one from Chili and one from South America. Of the third genus, *Mordacia*, which differs in the character of the teeth, only one species is known, *Mordacia mordax*, from the coasts of Chili and Tasmania.

LAMP-SHELL. See BRACHIOPODA.

LAMPYRIDÆ. See GLOWWORM; FIRE-FLY.

LANARK or **CLYDESDALE** is an inland county of Scotland, bounded N. and N.W. by the shires of Stirling and Dumbarton, W. and S.W. by those of Renfrew and Ayr, E. and N.E. by those of Linlithgow, Edinburgh, and Peebles, and S. by Dumfriesshire. The greatest length, N. by W. to S. by E., is 52 miles; the greatest breadth, E. to W., is 33 miles. The area is 889 square miles, or 568,868 acres, of which about five-twelfths are cultivated and an equal quantity moorland. In 1881 the inhabitants numbered 904,412—449,297 males and 455,115 females. In 1851 the number of inhabitants was only 530,000.

The coal, iron, and lead mines of Lanarkshire are very extensive and rich—there being nearly 400 coalpits in operation, 314 ironworks, 5150 puddling furnaces, and 846 rolling mills, and all kinds of manufactures are carried on in and around Glasgow in the Lower Ward. Besides the fire-clay which there abounds, mill-stone, limestone, and slate are quarried in various parts of the county, and lead is found at Leadhills, combined with a little silver.

Lanarkshire is divided into three districts, named the Upper Ward, Middle Ward, and Lower Ward.

The Upper Ward, or southern part of the county, is covered by hills and mountains, of which the highest elevations are about 2400 feet. On the summits of the hills and sides of the mountains are pastured numerous flocks of sheep, which, in the valleys, are intermingled with herds of black cattle. The Clyde and its tributaries, the Douglas, Avon, Calder, and several smaller rivers, have their sources in these mountains. The arable portion of this ward is inconsiderable, and chiefly on the banks of the Clyde and its tributaries. In this ward is the village of Leadhills, 1323 feet above the sea, and the highest inhabited place in Scotland. The lead mines here yield from 800 to 900 tons yearly. It was the birthplace of Allan Ramsay the poet, in 1685. There are also in this section of the county seams of excellent clayband iron-stone, limestone, coal, freestones, and slate, all of which are worked. Gold is no longer found in any quantity.

The Middle Ward is diversified by gently undulating grounds, there being no plains of any extent except in the valley along the banks of the Clyde. The prevailing soil is of a clayey nature, intermixed with sand. In some parts it consists of a deep fertile loam, resting upon a subsoil of loose gravel; in others it partakes more of a mossy character, and yields, in early seasons, good crops of oats, flax, and rye-grass hay, but in cold or late seasons the oats do not ripen well. Oats, barley, potatoes, and turnips form the principal crops, but there is also much wheat raised both in this and the adjoining ward to the north. This ward is peculiarly rich in a mineralogical point of view, containing, besides an abundance of limestone and sandstone, ironstone and coal; the latter almost of inexhaustible supply, and favourably situated. And in this ward, near Coatbridge, are placed the more extensive of the

works for smelting iron. Works for the manufacture of steel, tin-plates, water-pipes, &c., are numerous in this vicinity.

The Lower Ward, or northern part of the county, is of very limited extent, but as it contains the city of Glasgow, it is a very important one. There are immense fields of fire-clay, and the quality is considered fully equal to the Stourbridge clay. In their vicinity extensive works have been founded for the manufacture of crucibles, &c.; and there are extensive sandstone quarries and collieries, yielding coal and ironstone to a considerable extent. There is a considerable portion of arable land, but the soil of some parts is moist and moorish. Many of the mosses have been reclaimed, and they are all gradually lessening by peat-cutting, so that oats, rye-grass, and even wheat, now grow luxuriantly. The wheat is sown from the end of August to the beginning of November, and sometimes, though very rarely, in spring.

Much of the land of this county belongs to large proprietors. The dairy system has been prosecuted with great success. The cows are mostly of the Ayrshire breed, and what are denominated Dunlop cheeses are largely made. The draught horses of Lanarkshire, under the name of Clydesdale, are held in great estimation in the north of England and throughout the south of Scotland.

The climate of the county is almost as various as its soil. The Lower Ward, being more open to the sea breezes which prevail from the W. and S.W., is comparatively temperate. The climate in the Upper Ward is unusually severe.

In the Middle Ward the famous orchards still produce valuable crops, and to the cultivation of apples, pears, and plums that of gooseberries, currants, strawberries, and other fruits has been added with success. For some miles below Lanark and the Falls of the Clyde, the river offers a picturesque succession of towns, villages, and plantations. Husbandry, though improving, is backward. The manufactures comprise cotton and muslins, woollen, flax, and silk goods, glass, paper, locomotive and marine engines, chemicals, and other articles, besides the leading industry of shipbuilding, of which Glasgow is the great centre. Iron is manufactured at Glasgow, Shotts, Coatbridge, Wishaw, Lesmahagow, Monkland, Airdrie, &c. Steelworks have also been introduced.

The Forth and Clyde Canal, which connects these two rivers, throws branches into both Edinburgh and Glasgow. The Monkland Canal passes through the royalty of Glasgow, and affords cheap communication between that city and the collieries and ironworks in the neighbourhood of Airdrie. The Ardrossan Canal, originally projected to connect Glasgow with Ardrossan, was never carried further than Johnstone. It has now been filled up and converted into a railway between Glasgow and Paisley.

Lanark contains forty-three entire parishes and portions of four others. The presbyteries are included in the synod of Lothian and Tweeddale, and in that of Glasgow and Ayr. Under the Redistribution of Seats Act, passed in 1885, the county was divided into six single-member constituencies.

Lanarkshire was the seat of the Damii, in Valentia. It was afterwards part of the British kingdom of Strath-Clwyd. Glasgow has an ancient cathedral, a building of great beauty, erected by Bishop John Achaian, in 1133–36; Blantyre, remains of a priory. There are old churches at Biggar, Hamilton, and Bothwell; and castle ruins at Bothwell, Carnwath, Cadzow, Craignethan, Douglas, and Crawford, all on the Clyde.

LANARK, the county town of Lanarkshire, is 31 miles S.E. by S. from Glasgow by the Caledonian Railway, and is situated nearly in the centre of the county. It is a place of great antiquity. The appearance of the town has been much improved of late years, and at present there are many handsome houses built of freestone. The chief pub-

lie buildings are the two parish churches, a Free church, two U. P. churches, an Evangelical Union chapel, an Episcopalian and a Roman Catholic church, a grammar school, Roman Catholic orphanage, deaf-mute asylum and hospital, an infirmary, county buildings, assembly-rooms, library, militia barracks, court-house, and the usual commercial offices. In the parish church is a colossal statue of William Wallace sculptured by Robert Forrest, the self-taught artist. The Castle Hill, on the south of the town, was once the site of a royal residence; but every trace of it has disappeared. The old church, the date of which is unknown, and St. Nicholas's Chapel have been allowed to go to ruins, and even the site of the latter is uncertain. The borough was chartered in 1310, and is governed by a provost, three bailies, a judge of guild-court, a treasurer, and nine councillors. It is the head of a presbytery in the synod of Glasgow. The population of the parish (which contains 10,500 acres) in 1881 was 7580.

Lanark stands on elevated ground near the east bank of the Clyde, and in its immediate neighbourhood are several Roman and feudal remains, and the celebrated Falls of the Clyde, consisting of Corra Linn, 81 feet high; Stonebyres, 80 feet; and Bonnington, 30 feet, all in the midst of picturesque scenery. Lanark occupies the site of *Colania*, which was built partly on the Watling Street and partly on the bank of the Clyde, now crossed by two bridges. There are also five over the Mouse Water, one of which, 128 feet high, was built by Telford, near Wallace's Cave and the Cartland Crag, which rise 400 feet above the bed of the stream. In 978 Kenneth II. assembled a Parliament here. Lanark was the scene of the first military exploit of Sir William Wallace. During his residence here, after his marriage with the co-heiress of Lanington, he killed, in 1298, Hazelrigg, the English sheriff, and expelled his soldiers from the town. The town formerly had the custody of the standard weights of Scotland, but the Act of 1826, introducing the imperial standard, superseded their use.

LANARK, NEW, is a well built village to the south of the town of Lanark, and on the east bank of the Clyde. The population in 1881 was 706, who are employed in weaving and cotton spinning. Here Robert Owen founded one of the earliest infant schools in Scotland; and his first attempts to establish a new system of social organization (1815-27) were made in this village, which owed its foundation to his father-in-law, David Dale, in 1783. The spinning works are now in the hands of a company.

LANCASHIRE or **LANCASTER**, a north-western county of England, is bounded N. by Cumberland and Westmorland, E. by Yorkshire (from which it is separated by the long ridge popularly called the backbone of England), S. by Cheshire, and W. by the Irish Sea. Its form is irregular, being narrow at the north and gradually widening towards the south. The district of Furness, at the north-western extremity of Lancashire, is about 10 miles wide, and is separated from the rest of the county by the Bay of Morecambe, and by a narrow strip of the county of Westmorland. The greatest length of Lancashire is about 75 miles, and its greatest breadth about 43 miles. The area is 1887 square miles, or 1,207,926 statute acres. The population in 1881 was 3,454,225; in 1801 it was only 673,486. The density of the population is now greater than in any other county in England except Middlesex.

Surface and Coast-line.—The inland part of Furness is an integral part of the Cumbrian range. Mountains rising to the elevation of between 2000 and 3000 feet are there separated by narrow valleys watered by brawling streams or occupied by lakes. The whole of the eastern side of Lancashire also consists of mountains or lofty hills, and an elevated chain runs through the centre of South Lancashire, rising to the height of more than 1500 feet, and approaching within about 10 miles of the sea. A fertile plain extends along the coast from the river Duddon, on

the borders of Cumberland, to the estuary of the Mersey. This plain is not more than 3 or 4 miles wide at the northern extremity of the county, but it widens greatly in the lower part of the valleys of the Lune, the Wyre, and the Ribble; and in the valley of the Mersey it extends across the whole of South Lancashire. The principal Lancashire mountains are the Old Man or Maun (from an ancient British word, signifying a rock) of Conistone, 2577 feet; Pendle Hill, 1803 feet; Bleasdale Fell, 1709 feet; Boulsworth Hill, 1698; Rivington Pike, 1545 feet. In the southern half of the county there are extensive sandbanks running for many miles along the coast, and visible at low water. Towards the north the coast forms a deep bay, of which Furness on the north and Rossall Point on the south form the extremities. This large bay is divided into the two smaller bays of Morecambe and Lancaster by a tongue of low land projecting near the mouth of the river Lune. Further south the estuaries of the Wyre, the Ribble, and the Mersey run far into the land. A large area of these bays and estuaries becomes dry at low water.

The only islands along the coast are off the southern extremity of Furness. Walney Island, the largest, extends from N.W. to S.E. about 8 miles, in width nowhere more than one. The other islands of the group, Foulney, Pile of l'oudrey, Sheep Island, Roe Island, Dova How, and Old Barrow, are all small.

Geological Character.—The uppermost formation is a bed of rich alluvium extending along the coast. This is in general very good land, but is in some places covered with peat moss. Next is the new red sandstone, composed of red or coloured rock, and covered in many places with thick beds of marl and earth. In the hollows of these marl beds there are extensive peat mosses, both in North and South Lancashire. Great quantities of large timber trees, the remains of ancient forests, are found in these mosses. The coal-field of South Lancashire comes next, covering a large portion of that division of the county, and forming the chief natural cause of its manufacturing pre-eminence. It occupies a large irregular tract between the Ribble and the Mersey of 400 square miles. The pits are scattered over the whole field, the richest parts of which are in the neighbourhood of Manchester, Oldham, St. Helens, and Wigan. The total annual production of coal in Lancashire is 20,000,000 tons. The millstone grit forms the heights which skirt the eastern side of the county. The valley of the Ribble and that of the Lune are chiefly occupied by the carboniferous or mountain limestone, which rises into lofty hills and scours in the higher part of these two valleys. Furness is partly occupied by the last-mentioned rocks, and partly by slate-rocks of the Cumbrian system.

The iron ores at Furness are among the richest in Great Britain, and are very extensively worked—the total annual yield being 1,500,000 tons. Copper is also found in the neighbourhood of Conistone. Slate, flagstones, freestone, scythe-stones, brick, clay, and furnace sand are also among the mineral products of the county.

Rivers and Lakes.—Most of the rivers that water this county have their general course from north-east or east to south-west or south. Those of Furness flow from north to south. The principal rivers are the Lune in the north, the Wyre and Ribble in the centre, and the Irwell and Mersey in the south.

The Lune rises in Langdale Fells and Shap Fells in Westmorland; it enters Lancashire below Kirkby Lonsdale, and flows through a beautiful and fertile valley and a wide estuary into Lancaster Bay. The length of its course is 53½ miles, and it drains a basin or range of country extending over 434 square miles. It receives the Greta, the Wenning, and many small mountain streams, and is navigable for large vessels as high as Lancaster.

The Wyre rises among the fells or moorlands on the borders of Yorkshire, flows across the fertile district of the

Fylde, and after passing Fleetwood enters the Irish Sea near Rossall Point through a wide estuary, which, however, narrows at the mouth. Its length is 27 miles.

The Ribble rises in the Yorkshire mountains, a little to the east of Wharfedale, enters Lancashire near Clitheroe, flows past Preston into a wide shallow estuary, and enters the Irish Sea. The length of its course is 61 miles, and it drains a district extending over 501 square miles. It receives the Hodder, Calder, Darwen, Boddlesworth, and Douglas in its course to the Irish Sea.

The Irwell rises above Bacup, in the highest part of Rossendale Forest, and flows through a most populous valley, abounding in manufacturing establishments, to Manchester. It affords water-power to the towns of Bacup, Newchurch, and Bury, and receives the streams that flow through Bolton on one side, and Rochdale on the other. At Manchester the Irwell receives the Irk and the Medlock. There it turns to the west, flowing near Eccles and Banton-on-Irwell, and joins the Mersey at Lower Irlam, about 10 miles below Manchester.

The Mersey rises on the borders of Yorkshire, being formed by the union of the Etherow, which rises near the summit of the Manchester and Sheffield Railway, and the Goyt, which flows down from the highest part of the Cheshire hills. These two streams unite at a point named Water Meeting, near Crompton. At Stockport the Mersey receives the waters of the Tame, which flows past Staleybridge and Ashton-under-Lyne to Stockport. The Mersey, which forms the boundary of the two counties of Lancaster and Chester, flows from Stockport through a very fertile country, running about 4 miles south of Manchester, to Warrington. About half-way between these two places it receives the Bollin on the south and the Irwell on the north. From Warrington it flows to Runcorn, where the North-western Railway crosses it by a magnificent bridge. Below Runcorn the Mersey expands into a spacious estuary, and empties its waters into the Irish Sea, 3 or 4 miles below Liverpool and Birkenhead. The estuary is 16 miles long, 1 to 3 miles wide, and is greatly obstructed by mudbanks in its upper part, though containing a wide expanse of deep water in the lower. Formerly the Mersey abounded in salmon, and was frequented by large shoals of herrings; it still teams with flounders, sparlings, conger-eels, and shrimps. The Mersey and Irwell are navigable from Liverpool to Manchester. Below Runcorn the former river receives the Weaver, a large stream that flows through the salt-field of Cheshire. The Mersey is 68 miles in length, and, including the country drained by its numerous tributaries, is the outlet for a wide district, extending over an area of 1706 square miles.

There are several smaller streams in the county or its borders. Among these are the Duddon, the Leven, the Keir, the Yarrow, the Alt, and the streams known as Ditton Brook, Sankey Brook, and Grazebrook.

In Furness lie two considerable lakes, Windermere or Windermere, and Conistoun Water. Windermere, which belongs in part to Westmorland, is about 11 miles long, and varies from 500 to 1700 yards in breadth. It is the largest lake in England, and its greatest depth is rather more than 200 feet. It receives the waters of many mountain streams, including those of the Bratley and Rothay, and also those of Esthwaite Water and a few small lakes and tarns; the united waters flow by the Leven into Morecambe Bay. The shores of this lake are in general beautifully wooded, especially on the western side, where the steep heights of Furness Fell rise from the lake clothed with a forest of larch and fir. In the centre of the lake is a group of small islands, the largest of which comprises 28 acres. Bowness, beautifully situated on the eastern side of Windermere, and Ambleside, at its northern extremity, are two of the most attractive places in the Lake district;

but the whole of the shores, both on the Lancashire and the Westmorland sides of Windermere, are covered with beautiful villas and picturesque villages. Among the numerous varieties of fish found in this lake is the char, which is also an inhabitant of Conistoun Water, and when potted is highly esteemed as a delicacy. Conistoun Water is about 6 miles long, and rather less than one broad, with a maximum depth of 240 feet. Esthwaite Water is also a very pretty lake, situated among the mountains, and there are several other smaller lakes or tarns.

Canals and Railways.—The Sankey Canal was the first formed in Lancashire or in England. It originally extended only from the coal-field near St. Helens to the river Mersey at Sankey Bridge below Warrington, but it has since been carried along the north bank of the river Mersey to Widness Dock, opposite Runcorn, where many manufactories have been established and a considerable town has grown up. The Bridgewater Canals consist of a canal running from the Worsley collieries to Manchester; of a much more extensive one starting from the former, and running down the valley of the Mersey to Runcorn, thus forming, with the estuary of the Mersey, a complete line of water-communication from Manchester to Liverpool; and of a third canal from Worsley to Leigh, continued from Leigh to Wigan. Their whole length is about 36 miles, and they still bear traces of the genius of Brindley, as well as of the perseverance and self-sacrifice of Francis, duke of Bridgewater, who gave up the greater part of his life and nearly the whole of his income to the construction of these noble works. The first of these canals is connected with extensive tunnels and underground coal-works at Worsley. The Leeds and Liverpool Canal, about 140 miles in length, extends from the port of Liverpool to the navigable river Aire at Leeds, and not only connects Liverpool and Leeds, but forms the greater part of a line of water-communication extending from the Mersey to the Humber, traversing the coal-fields of Lancashire and Yorkshire near the towns of Ormskirk, Wigan, Blackburn, Accrington, Burnley, Colne, Keighley, Bingley, and Bradford. The Preston and Lancaster Canal commences at Preston, and runs northward to Lancaster, from which place it has been continued to Kendal. The Rochdale Canal commences near Manchester, and proceeds by way of Rochdale and Todmorden into the West Riding of Yorkshire, following the line of the river Calder, and joining that river near Halifax, from which point it is navigable to the Humber. The Ashton Canal also commences near Manchester, and runs to Ashton, throwing out branches to Stockport, to the Huddersfield Canal at Dukinfield, and to Oldham. It is also carried through the hills into Yorkshire, passing the town of Huddersfield, and joining the Calder near that town. The Peak Forest Canal connects the limestone quarries of Derbyshire with the manufacturing districts of Lancashire. The Manchester, Bolton, and Bury Canal runs from the river Irwell, up the valley of the Irwell, to Bury.

The first great passenger railway constructed in England was the Liverpool and Manchester, laid down by George Stephenson, and opened in the year 1830. This line now forms part of the immense undertaking of the London and North-western Railway Company, which extends from London to Scotland, and is connected with Liverpool, Manchester, Warrington, Wigan, Preston, Lancaster, and numerous other important towns. In the southern division of Lancashire the railway system is now more completely developed than in any other part of the kingdom. The middle division is also well provided with railways, and even in the detached northern portion, the Furness Railway, with its various branches and dependent lines, supplies a much greater amount of railway accommodation than from the character of the county might have been anticipated. Besides the vast system of the London and North-

western Company, the Midland and Great Northern lines have also run into Lancashire, and help to increase the railway facilities. There is not, in fact, a town in Lancashire of any magnitude which is not united with the whole system of railways throughout the county, and consequently with the railway system of the whole kingdom.

Climate and Agriculture.—The climate of Lancashire is mild in winter and moist in summer, owing to the vicinity of the Atlantic Ocean; but from the same cause it is exposed to frequent winds and occasional storms. The high hills which run along its eastern boundary shelter it from the cold easterly winds, but at the same time arrest the clouds that come from the Atlantic, and produce more abundant rains than occur in the eastern parts of England. The average rainfall is about 45 inches per annum.

Near the coast the land is generally level, and the soil consists of a deep alluvial earth, in some places covered with sand brought from the sea-shore by the westerly winds. The soil is very favourable for grass, roots, and garden vegetables. A fair quantity of wheat is grown, but oats are better suited both for the climate and soil. Potatoes are cultivated in the fields as well as in the gardens, and from the lightness of the soils, the abundance of manure, and the moistness of the climate, the crops are very abundant, and of excellent quality. Early potatoes are frequently raised, with crops of turnips after them in the same year. These are succeeded by wheat or barley and grass seeds. In the districts furthest from large towns, a four years' course of two green and two white crops is found to answer, but in the neighbourhood of the towns the land is chiefly in grass, oats, and potatoes. The hilly tracts are almost entirely laid out in grass, owing to the great demand for milk and butter. Most of the farms in the county are under 100 acres, though there are some of much greater extent both in North and South Lancashire. The cultivation of the whole county has greatly improved during the last thirty years. In that period nearly the whole of the land has been thoroughly drained, the fields have been enlarged by the removal of useless fences, and very good farm buildings have been erected on most of the large estates. Market gardening is carried on to a great extent around all the large towns, but especially in the neighbourhood of Liverpool, Manchester, and Warrington, and more than 5000 families are employed in garden cultivation. According to the official agricultural returns published in 1885 there were 800,000 acres—or three-fourths of the entire area—under cultivation. Corn was grown on 100,000 acres (65,000 being devoted to oats); green crops on 56,000; clover on 66,000; and 570,000 were permanent pasture.

The ancient breed of long-horned cattle is almost extinct in Lancashire, having given place, like nearly all the original breeds, to the short-horned or Durham, which gives twice as much milk, and fattens in half the time. Comparatively few sheep are kept in the county, except in some of the thinly peopled districts of the north. There is a great demand for powerful horses in the seaports and manufacturing towns, and much attention is given to the rearing of horses and cattle. In 1885 there were 220,000 cattle and 265,000 sheep in the county.

Commerce and Manufactures.—Lancashire is the most important manufacturing county in England. The staple manufacture is that of cotton, for which it may be said that Lancashire is the chief emporium and workshop in the world. At the outbreak of what was called the cotton famine, resulting from the war between the two great divisions of the United States, it was estimated that upwards of 750,000 persons in Lancashire were dependent upon the cotton trade; shortly afterwards (December, 1862), it was ascertained that the actual number of workers was 472,519. The number of bales of cotton received from all sources was about 3,500,000 annually, while over 28,000,000

spindles and 300,000 looms were employed in its manufacture. The American War gave a terrible blow to this vast industry. At the date above quoted half the operatives were out of work, and two-thirds of the remainder were working short time, and later the whole industry may be said to have come to a complete standstill. We have not here space to tell how admirably the distress was borne, and by what means its pressure was lightened; but it may not be amiss to notice that under the powers given by the Lancashire Public Works Acts of 1863-64, nearly £2,000,000 were borrowed by the local authorities, and expended on the making of roads, drainage, the formation of parks and recreation grounds, the labourers, under skilled overlookers, being the operatives whom the dearth of cotton had temporarily deprived of occupation.

Manchester is the capital of the cotton district, and the trade is also carried on on a very large scale at Bolton, Blackburn, Preston, Burnley, Accrington, Haslingden, Bacup, Bury, Rochdale, Todmorden, Oldham, Ashton-under-Lyne, and in numerous other towns and populous villages. The number of persons employed in the cotton trade at the present time is nearly 600,000, and their united labours are estimated at £100,000,000. The silk, woolen, and flax manufactures are also carried on, though not on so extensive a scale as that of cotton. Many other branches of industry are pursued in the county. Among these are mining, engineering of every description, ship-building (both iron and wood), iron and brass manufactures, hat factories, plate-glass, bottle, and pottery works, alkali, soap, and chemical works, pin manufactories, watch-movement manufactories, and the making of all kinds of tools and implements.

The total number of collieries is 600, the production of coal from which amounts to 20,000,000 tons per annum. There are also thirty iron mines, which annually produce nearly 1,500,000 tons of ore. There are thirty blast furnaces in operation for the manufacture of pig iron, and the produce is about 800,000 tons per annum. The commerce of Lancashire is as vast as its manufactures. Nearly a half of the merchandise exported from the United Kingdom is shipped from the port of Liverpool. The imports are also on a gigantic scale, cotton, grain, and timber being among the most important articles. The value of the cotton imported into Liverpool has for some years varied from £50,000,000 to £60,000,000 according to the fluctuations in the price of that article.

Administration, &c.—The county palatine of Lancaster is included in the northern circuit, and is principally in the diocese of Manchester, though small portions are comprised in the dioceses of Carlisle, Liverpool, and Ripon. It is divided into six hundreds and into twenty sessional divisions. By the Redistribution of Seats Act passed in 1885 the county of Lancashire has twenty-three representatives in the House of Commons, and thirty-one are returned for the various boroughs, making a total of fifty-four.

Antiquities, History, &c.—Little more is known of the history of the county before its conquest by the Romans, than that it was inhabited by the great tribe of the Brigantes, who were spread over the country, from the Mersey and Humber to the Tyne and the Solway. They were subdued by Agricola. The town of *Ribodunum*, now Ribchester, on the banks of the Ribble, is mentioned by Ptolemy the geographer as one of their settlements. After the Roman conquest of Britain, the whole territory of the Brigantes, which received the name of *Mazima Cesariensis*, was covered with magnificent roads, and their course can still be traced in many parts of Lancashire. The most important Roman positions were Manchester, Ribchester, and Lancaster, all of which derive their names from the fact of their having been *castra* or camps of the Romans. Manchester was the principal, and several Roman roads have been traced diverging thence

as from a common centre. After the retirement of the Romans from Britain, the Britons formed several states along the western side of the island, some of which long resisted the attacks of the Saxons and Angles, who had landed in the east, and who, after a conflict of 200 or 300 years, succeeded in conquering the more level parts of South Britain. The time at which the Saxons succeeded in establishing themselves in the present Lancashire is very uncertain. According to British accounts the favourite British hero Arthur, among many other victories, gained a great battle over the Saxon invaders on the banks of the river Douglas. Saxon chroniclers assert that Egfrid, the son of Oswy, king of the Saxon Northumbrians, conquered a part of this district between the years 670 and 685; but it is uncertain whether Lancashire as a whole was brought into entire subjection by the Saxons before the time of Edward the Elder, in 921, who subdued both the Danes and the Cumbrian Britons about that time. At the epoch of the Norman Conquest the country now known as South Lancashire was described as the land lying between the Ribble and the Mersey, and that part of the county that lies to the north of the Ribble was described as belonging to Yorkshire. The county of Lancaster is first mentioned by its present name in the reign of Henry II.

The earldom of Lancaster was created by Henry III. in favour of his younger son Edmund, and the duchy by Edward III. in favour of Henry, earl of Lancaster, the grandson of the above Edmund. Lancashire was made a county palatine for John of Gaunt, duke of Lancaster, son of Edward III., who had married Blanche Plantagenet, the daughter and heiress of the said Henry, duke of Lancaster. When Henry of Bolingbroke, the son of John of Gaunt, seized upon the crown of England, the duchy of Lancaster was still retained as a distinct possession, though inseparably connected with the crown of England, which is the case to the present day. In the wars of York and Lancaster, the house of Stanley rose into great power and influence in Lancashire and Cheshire; and the closing battle of that long and sanguinary war, fought at Bosworth Field, was decided by the attack of the Lancashire men, headed by Thomas lord Stanley, who was created Earl of Derby as a reward for his services to Henry VII.

In the great Civil War, Lancashire, like all the northern counties, was the scene of numerous desperate conflicts; the greater part of the nobility and gentry, including the Earl of Derby and Viscount Molyneux, taking the part of the king, while most of the towns adopted the part of the Parliament. The most memorable events of this Civil War in this part of England were—the siege of Manchester by the Royalists; the storming of Bolton and Liverpool, also by the Royalists; the defence of Lathom House by the heroic Charlotte, countess of Derby; the defeat of the Duke of Hamilton's army by Oliver Cromwell, near Preston; and the defeat of the Earl of Derby by Colonel Lilburne in Wigan Lane.

The most celebrated castles are those of Lancaster and Hornby, both of which are in good preservation. The castles of Thurland and Greenhalgh, Houghton Tower, and the ancient castle of the Stanleys, known as Lathom House, are either in ruins or entirely destroyed; the stronghold of the De Lacy family at Clitheroe is a picturesque relic of antiquity. The Castle of Liverpool was destroyed by order of the king in the reign of Charles II., but the foundations can still be traced. Numerous fine manor houses exist in different parts of the county, the most beautiful of which is Speke Hall, near Liverpool.

The monastic ruins are of great interest. Furness Abbey, in the Vale of Deadly Nightshade, near Dalton, in Furness, is one of the finest monastic memorials in England. It is situated in a deep, narrow glen, but surrounded by a fertile and well-cultivated country. Its remains are magnificent; and from the seclusion and picturesque

beauty of the neighbouring scenery, produce a vivid impression on the mind of the spectator. The abbey was founded by King Stephen when Earl of Morton and Boulogne. It was magnificently endowed by him and his successors, and was for many ages in the first rank among the monastic institutions of England. Its ruins, which are of the Norman and Early English character, include portions of the church, chapter-house, the cloisters, the school-house, and other buildings. Whalley Abbey, founded by the De Lacys, earls of Lincoln and constables of Chester, is also a noble pile, beautifully situated on the river Calder, near the point where it joins the Ribble. Remains of monastic buildings of smaller importance are found in other parts of the county.

LANCASTER, the chief town of the above county, and a municipal and former parliamentary borough, and a river port. It was once a Roman station and a city of great antiquity, is distant 232 miles from London by the North-western Railway, and has railway communication with all parts of the kingdom. The town is called *Lancastre* in the Domesday Survey. It is pleasantly situated on rising ground on the south side of the river Lune, about 6 miles from the mouth of the estuary in Lancaster Bay. The Lune is crossed by a handsome bridge on five arches, and by a viaduct and aqueduct for the railway and canal. The houses are built of stone, and in general the streets are narrow; but those towards Skerton are large and handsome, and there are many fine villas in the neighbourhood. The town is paved, lighted, and well supplied with water. On the highest point of land stands the castle, built before the Conquest, but greatly enlarged in the reign of Edward III. The view from John of Gaunt's round tower is magnificent. This castle was the head of a duchy palatine created for John of Gaunt, "time-honoured Lancaster," with a separate court and jurisdiction over the vast estates which then belonged to the duchy of Lancaster in all parts of England. The other principal public buildings are St. Mary's Gothic Church, near the castle, built on the site of an ancient priory; several other churches, including St. Peter's, with a spire of 245 feet; numerous chapels; county courts; shire-hall and county jail within the castle walls, which stretch about 380 feet by 350, with the statue of George III. in the centre; theatre, town-hall and exchange, market, custom-house, music-hall, Oddfellows' hall, assembly rooms, savings bank, mechanics' institute, dispensary, barracks, baths; ancient free grammar-schools, blue-coat and other schools; a union workhouse; and the Ripley Hospital, erected and endowed in 1864 by Mrs. Ripley, in memory of her husband, for the maintenance and education of 300 children; the buildings include a central clock-tower 110 feet high, and the erection and endowment are said to have cost £130,000. A very extensive and carefully arranged lunatic asylum was erected in 1867, accommodating 400 inmates, and standing within an inclosure of 40 acres of tastefully laid-out pleasure grounds. Public baths and washhouses were built in 1863, at the cost of T. Gregson, Esq.; and a beautiful cemetery, with suitable chapels, has been laid out in a very fine position. There are several almshouses, and an establishment for promoting the fine arts. The Williamson Park is a fine piece of land about 40 acres in extent, and situate on elevated ground, on the east side of the town, commanding extensive views of Morecambe Bay, the Furness district, and the Lake mountains. The manufactures are of cotton, silk, linen, table baize, worsted yarn, cabinet manufacture, sailcloth, rope, twine. There are salmon fisheries in the Lune, and ship-building is carried on to some extent. The principal quay and dock are at Glasson, 5 miles below the town, but vessels of moderate size can come up the Lune. Port Morecambe, a terminus of the Midland Railway Company, and a place of embarkation for Belfast, and where a very

fine pier has been erected, is also very near to Lancaster. The chief articles imported into Lancaster are sugar, coffee, rum, mahogany, dyewood, &c. The population in 1881 was 20,724. Lancaster is one of the most ancient of the English boroughs, its first charter having been granted by King John, and confirmed by subsequent monarchs. It is at present governed by six aldermen and eighteen councillors.

Lancaster is supposed to have been a Roman station. Urns, altars, and other antiquities have been discovered, and the affix *caester*, given by the Saxons, serves to confirm the fact. The Normans found the town in a state of decay, the ancient city reduced to a village, and the Roman *castrum* little better than a ruin. It was given by William the Conqueror to Roger de Poitou, who built a castle on the site of the ruined *castrum*: a flourishing town soon gathered round; the burgesses of Lancaster acquired extensive privileges from their lords, and it continued to increase in importance. King John conferred "the honour of Lancaster" on his favourite Gilbert Fitz-Reinfrede, and gave it a charter. The first Earl of Lancaster was created in 1266; and in 1351 Henry earl of Derby was advanced, by special charter, to the title and dignity of Duke of Lancaster, with power to have a chanery in the county, and "to enjoy all other liberties and regalities belonging to a count palatine." John of Gaunt, fourth son of Edward III., married Blanche, the duke's daughter, and by virtue of this alliance succeeded to the title. His son, Henry of Bolingbroke, first Earl of Derby, and afterwards Duke of Hereford, became Duke of Lancaster on his father's death in 1398, and finally King of England in 1399, from which time to the present this duchy has been associated with the regal dignity. Lancaster espoused the Royalist cause during the Parliamentary war, and was visited by the Jacobite troops in the rebellions of 1715 and 1745.

LANCASTER, DUCHY OF. Lancaster was made a county palatine by Edward III., and conferred on Henry, duke of Lancaster, and at his death on John of Gaunt and his heirs for ever. Henry VI. was, therefore, hereditarily duke and count palatine, and on his attainder, soon after Edward IV.'s accession, the duchy and county were forfeited to the crown, and confirmed on Edward IV.; and afterwards, in like manner, on Henry VII. and his heirs for ever. The queen is now duchess and countess palatine of Lancaster. The revenues of the duchy are independent of those granted by the CIVIL LIST, and the net proceeds are paid over to the privy purse, uncontrolled by Parliament, except that an account must be annually rendered.

The duties of the chancellor of the duchy and county palatine are few and unimportant, as the administration of justice is now assimilated to that of the rest of England. The office is, however, usually conferred on an eminent statesman, frequently a member of the cabinet, whose emoluments are about £2000 per annum. By 17 and 18 Vict. c. 12, the chancellor of the duchy with the two lords justices of the Court of Appeal form the palatinate court of appeal.

LANCASTER, SIR JAMES, a skilful seaman of the Elizabethan period, who conducted the first voyage undertaken by the East India Company in 1600-3, and established commercial relations with the princes of Acheen in Sumatra and Bantam in Java. He was a firm believer in a north-west passage; and Lancaster Sound, a deep inlet in Baffin's Bay, 74° N. lat., was named after him. He died in 1620.

LANCASTER, JOSEPH, celebrated for his connection with the educational movement of the beginning of the present century, was born in Southwark in 1778, his father, who had served in the Foot Guards, being at that time a Chelsea pensioner. When a young man Lancaster joined the Society of Friends, and at the age of twenty

began to teach a few poor children in a room in the Borough Road, Southwark. An enthusiast in this work, his efforts were attended with much success, and his school grew until over 1000 children were gathered together. He adopted, with some alterations, the monitorial system of Dr. Bell [see BELL, ANDREW, D.D.], and introduced many new methods of teaching, his material appliances, owing to his narrow means, being of a very scanty character. His efforts attracted the attention of some of the friends of education, and in 1805 he had an interview with George III., who expressed his approval, and uttered the wish "that every poor child in his dominions might be able to read the Bible." In 1808 some noblemen and gentlemen founded a society called at first the Royal Lancasterian Institution, but which was afterwards known as the British and Foreign School Society. The aim of this society was to spread elementary education among the poor, combined with religious instruction of an unsectarian character, and it received chiefly the patronage of Liberals and Nonconformists, the National Society being instituted in 1811 for imparting instruction combined with the principles of the Established Church. For some years Lancaster laboured as the apostle of his method and system, travelling up and down the country, and lecturing upon the subject; but he was a quarrelsome and extravagant man, and becoming insolvent he emigrated in 1818 to America. Here he laboured as a lecturer, at first with success, but afterwards hampered by pecuniary difficulties, and at last his only means of support was a small annuity provided by his friends in England. He died in consequence of being run over by a carriage at New York, in October, 1838. His only works were a few pamphlets bearing upon education and his own personal experiences. The Lancasterian system of education has long been given up in favour of improved methods which have been learned in a more extended experience of the work, but his name deserves remembrance on account of the impetus he helped to give to the work of national education in its early and militant stages.

LANCE, a weapon of offence consisting of a pointed blade of steel affixed to a long smooth wooden shaft. The term is generally used to designate a weapon that is held in the hand when the stroke is given, missile weapons of a similar construction being called javelins or darts. The lance or spear is one of the oldest of the weapons used in war, and previous to the introduction of firearms it was perhaps the most effective. It was used by all the great nations of antiquity, and during the middle ages it formed the favourite weapon of those who fought mounted, so that the terms *lance* and *man-at-arms* were synonymous. The lance carried by the mediæval knight was made of tough ash, and it was weighted at the end so as to enable it to be poised when grasped near the hilt. See also LANCERS.

LANCE-HEAD (*Bothrops*) is a genus of venomous serpents belonging to the family Crotalidae, but distinguished from the true RATTLESNAKES (*Crotalus*) by having the tail ending in a horny spine instead of a rattle. All the species are inhabitants of America and the West Indies. The Fer-de-lance (*Bothrops lanceolatus*) is one of the most deadly of the group. It is especially abundant in the islands of Martinique and St. Lucia. The head is broad, flattened on the upper surface, and nearly triangular in consequence of the lateral projection of the jaws at the point of junction, giving a general resemblance to the head of a lance. The body is cylindrical, about 5 or 6 feet in length, and the tail is conical and slender. The fer-de-lance carries on an incessant war against lizards, small birds, and rats, which latter form the chief part of its food. This serpent haunts chiefly plantations of sugarcane, but is often found in the houses of the negroes. It is very active in its movements, and bold in attacking intruders. The Jaracara (*Bothrops brasiliensis*), another deadly lance-head, is a native of Brazil. It has a thick

body, becoming slightly more slender towards the tail. The colour is dark olive above, and yellowish-white beneath. It is found in Bahia and the hotter parts of Brazil towards the banks of the river Amazon, where it feeds upon birds

and small mammals, such as squirrels. In length it varies from $3\frac{1}{2}$ to $4\frac{1}{2}$ feet, with a circumference of 4 inches about the thickest portion of the body.

The Rat-tail (*Bothrops atrox*) is the most deadly of



Fer-de-lance (*Bothrops lanceolatus*).

the group. It is so called because the tail, instead of tapering from the body, becomes suddenly very slender and rat-like. It occurs in Brazil and the West Indian Islands.

LANCET (*Amphioxus lanceolatus*) is an extraordinary animal possessing the primitive characters of the Vertebrata, but presenting such a low stage of development that it has to form a primary division of that subkingdom. Fishes, amphibians, reptiles, birds, and mammals form the group Craniata, to which the lancelet is opposed in the systems of modern zoologists under the names Acranata, Leptoecardia, or Cephalochorda. The lancelet was first detected on the Cornish coast in 1771, and a specimen being sent to Pallas, the celebrated naturalist of Russia, was described by him as a slug under the name *Limax lanceolatus*. The Cornish ichthyologist, Jonathan Couch, rediscovered it in 1831 on the same coast where it was first found, and sent it to Yarrell, who described it in 1836 in his "History of British Fishes" as a fish of very low organization. In 1834 it was again discovered by Costa on the Neapolitan shores, who described it in the "Annuario Zoologico" under the name of *Branchiostoma tubricum*, and some years after, in his "Fauna of the Kingdom of Naples," gave a fuller account of it. Costa also perceived its affinity to the lowest fishes. Yarrell had not met with Costa's description when he described it, and his generic name *Amphioxus*, though two years later than *Branchiostoma* of Costa, is generally used by English zoologists.

Many examples of the same or closely allied species have since been obtained on the various parts of the British coast, and it seems to be widely distributed in temperate and tropical seas, having been found in shallow water in North America, West India, Brazil, Peru, Australia, and China. The lancelet lives in shallow water in sandy bays. When disturbed it usually buries itself in the sand. When taken it swims rapidly with a snake-like motion, but after a time settles down, unless disturbed, lying flat on its side. It is very tenacious of life, dislikes the light, and bears handling without injury. Its food was found by Müller in the intestinal canal of some of the specimens he examined; it consisted of diatoms and infusorians. The lancelet does not swallow, but simply imbibes its food.

The lancelet is from 2 to 3 inches long. The body is of a silvery whiteness, smooth and ribbon-like, tapering to a point at each extremity. Beneath the anterior acute extremity is a rounded and somewhat spatulate rostrum,

beneath which is the mouth, a longitudinal opening fringed on each side by a row of long filaments or cirri, which can close in and clasp alternately, so as to protect the oral opening. The mouth leads into a large dilated pharynx, the walls of which are richly ciliated and perforated by about 100 slits. The alimentary canal is continued into a simple straight intestine opening in the anus, which is situated on the ventral surface close to the end of the body. At the junction of the pharynx and intestine is given off a hollow gastric tube, which represents the liver of higher vertebrates. Along the back runs a membranous dorsal fin supported by small fin-rays; it dilates near the sharp posterior extremity to form a kind of caudal fin, which runs round on the ventral surface to the anus. On the other side of the anus is a short median fin running as far as the atriopore or opening of the branchial chamber. The atrium is a chamber surrounding the pharynx, and formed by the downgrowth and fusion in the middle line of two folds of the body-wall. Water containing minute particles of food enters the mouth. The food passes along the pharynx into the intestine and is digested. The water streams through the gill-slits in the pharynx, which are supplied with bloodvessels and so effect respiration: it then passes into the atrium and is expelled at the atriopore. The outer wall of this branchial cavity is thus equivalent to the operculum of fishes, and the cavity is not a body cavity. The gelatinous axial rod or notochord, which exists in all vertebrates in embryo, but in the bony fishes and all higher forms is replaced by the vertebral column, is in its most primitive condition in the lancelet. It has no cartilaginous sheath, and extends throughout the whole length of the body, running right through the head (whence the name Cephalochorda); there is therefore no skull. The nerve cord is a hollow tube lying on the notochord, and continued throughout the body nearly as far anteriorly as the notochord without any enlargement to form a brain. At the anterior end of the nerve cord is a small pigmented eyespot. A large pair of nerves are given off to the parts round the mouth. Nerves are given off at regular intervals corresponding to the muscular segments of the body from the dorsal surface of the nerve-cord on each side. The muscular system is well developed, the body being marked out into sixty-two segments by broad lateral bands of muscles corresponding to the myotomes or muscular segments of fishes.

The circulatory system is very simple. The blood is colourless and contains only colourless nucleated corpuscles. There is no heart at all equivalent to the heart of other vertebrates. There is a great ventral vein running along the ventral surface, and forming a plexus of bloodvessels on the gastric cæcum. In the region of the pharynx the ventral vein sends up branches, contractile at their bases, between each gill-slit, and also two branches to the oral region. From the oral region arise two arteries or aortæ, the left of which receives the blood from the vessels which run between the gill-slits. The two aortæ then unite into a single dorsal aorta, which runs along the back. The contractile region of the ventral vein is what supplies the place of a heart. The generative products are glandular masses hanging freely in the atrial chamber: they are expelled through the mouth.

It is doubtful whether there are any organs comparable to the kidneys of higher vertebrates. A pair of minute funnel-shaped organs situated in the twenty-second segment, and opening from the body-cavity into the atrium, are considered by some the homologues of the kidneys. The development of *Amphioxus* has been carefully studied. The egg undergoes a complete segmentation, and the *gastrula* or *diblastula* is formed by invagination. The nervous system originates by the formation of a depression on the surface, the edges of which meet and fuse, inclosing a hollow tube. The body-cavity is formed by the nipping off on either side of a portion of the primitive digestive cavity. The notochord is formed by the thickening and separation of some of the cells which line the primitive digestive cavity. The gill-slits at first communicate freely with the exterior. A species of lancelet having no anal or caudal fin has been described from Moreton Bay.

LANCERS, the name given in the British army to the 5th, 9th, 12th, 16th, and 17th regiments of dragoons, who are armed with lances, swords, and pistols, and who occupy a position corresponding to the French *Lanciers* or the German *Uhlans*. The lance, as a weapon for cavalry, was brought into prominence by Napoleon I., who incorporated a regiment of Polish Lancers with his bodyguard in 1807, and afterwards increased this branch of the service until, in 1812, the lancers numbered 10,000 men. In the Franco-German war of 1870-71 the Prussian lancers, or *Uhlans*, took a very prominent part, and they rendered the most important services both in collecting information and in actual fighting. It has been found that in many combats the lance, from its long reach and the facility with which it can be used to thrust on the left as well as on the right hand side, has some advantages over the sabre. In the fighting with the Arabs of the Soudan in 1884 the British cavalry, after the first engagement, provided themselves with native spears to use in preference to their swords. In the Civil War in the United States a lancer regiment was raised at Philadelphia, but the lance was found an unsuitable weapon for the warfare as there carried on; and at the present day the American cavalry, when on active service, find in the revolving pistol a more effective weapon than either lance or sword.

LANCET-ARCH, a variety of the arch in Early Gothic architecture which was prevalent in England chiefly in the thirteenth century. It often surmounts a long narrow window with its sharply pointed form, deriving its name from its similarity to the shape of a lancet-head. Several lancet-windows combined give a beautiful window, as for instance the fine one called the "Five Sisters," made up of five lofty single lancet-windows, occupying the eastern end of one of the transepts in York Minster. (See Plate II. ENGLISH CATHEDRAL ARCHITECTURE.) Bishop de Lucy is said to have first introduced the lancet-arch, supported by clusters of slender columns bearing capitals of foliage, in the cathedral of Winchester. The lancet-window forms a very characteristic feature of the Early English architecture.

LAND. As it is from the soil of the earth nearly the whole of human wealth is drawn, the questions which relate to its possession and tenure have at all times been of paramount importance. A large portion of the written history of mankind is taken up by the record of struggles for its possession, and with accounts of the experiments that have been made by nations in seeking to turn the land to the best use. In the history of nations of old standing, the use of the land can be traced from the simple customs of savagery to the elaborate and complex laws by which it is regulated at the present day, while by extending our view we may find every historical system of land tenure in present use in some one or more portions of the earth. The history of primitive man has not yet been written, but if we accept the current notion that his condition was originally that of savagery, from which by slow and hesitating steps some portions of the race have reached the improved but yet very imperfect social organization of civilization, we can by observation of existing races trace the various steps of the elevation with clearness and accuracy. Thus in connection with our present subject we find men whose only use of the land is to gather from it such roots, seeds, and fruits as it naturally yields, and to find in it a field for hunting, fishing, &c. Wherever such men are gathered into the social union of clans or tribes, we usually find that they regard some portions of the land as the possession of their own tribe, and they readily resent the intrusion of the members of others upon it. In a similar way, when we observe the usages of those who have reached the pastoral stage, and who find in the land the means of supporting their flocks, herds, horses, camels, &c., we find the different feeding grounds and wells are regarded as the possessions of certain tribes or peoples, and as such are marked out and defended. At the same time all the free members of such tribes enjoy common rights in the land thus used and occupied, and they do not, as a rule, recognize any private or personal possession. With respect to the Aryans there is every reason to believe that the people who formed the original stock had reached the pastoral stage previous to the first dispersion, but it is supposed that the practice of agriculture did not arise until after that event. When, however, it was discovered that the soil would repay cultivation, and men gradually became more settled, certain spots of land became of greater value than others, and were taken possession of for agricultural purposes, and the village took the place of the encampment. Of course the keeping of flocks and cattle would be continued as well, and thus a part of the tribe would be devoted to their care, while others tilled the soil, the produce yielded by it being regarded as a common possession. The cultivated land was regarded as the property of the community, but it was easy to pass from this stage into another, in which certain families owned and cultivated such portions as they opened up, and used or bartered its produce at their discretion. Thus there arose the conception of private property in land, and a principle was accepted from which the most important consequences have been subsequently evolved. Those who secured for themselves and families a portion of land as a possession would naturally do their best to make it as productive as possible, and gaining experience from contact with nature would acquire skill as cultivators, and thus produce annually a surplus beyond their own immediate wants. The existence of such a surplus would render possible the exclusive pursuit of other arts on the part of some members of the family or of the village, and manufactures and barter would follow in due course together with other necessary adjuncts of civilization. At the same time the possession of the whole of the fruits of the soil would give the owners of the land peculiar power over their fellows, and laws would be required to regulate the ownership and its use. The problem of securing the best

possible cultivation of the soil and the utilization of its products for the general good of the community has not proved by any means easy of solution, and though many experiments in the shape of land laws have been tried none up to the present have been attended by complete success. At the present time we find that even among the European nations which are justly regarded as the most advanced in civilization, very different systems of land tenure are to be found, systems which not only differ in details, but which are deliberately designed to produce opposite results. Thus, for instance, we find in France it has been the aim of the governments which have prevailed since the Revolution to divide the land among as many cultivators as possible, a process that has been secured by means of the law of equal division among children on the death of their parents. According to recent returns there are about 3,000,000 properties in France which are less than 25 acres in extent, while of estates of more than 100 acres there are less than 150,000. Of the cultivators two-thirds, in round numbers, work upon their own land to one-third occupying as tenants, and there are twice as many peasant proprietors as there are agricultural labourers. In Germany, since the passing of the Stein and Hardenberg reforms, a somewhat similar state of things has been brought about, and large portions of its cultivated land are occupied by small owners, who live on their own land and till it themselves, though the large estates are more numerous than in France. In Belgium, Switzerland, Denmark, Sweden, and Norway the land is also divided into small holdings, which for the most part are cultivated by the owner and the members of his family. When, however, we turn to the land system of Great Britain we find a totally different system prevailing, large estates being the rule and small holdings the exception. In the articles under FEUDAL SYSTEM and FOLIO LAND, in this work, a sketch has been given of the early history of the English system of land tenure, and of the manner in which the national possessions were disposed of by successive monarchs, and under ENTAIL we have noticed the method by which large estates have been kept in the possession of wealthy families. In the working of this system the small freehold properties which formerly supported the yeomen have been gradually absorbed by the owners of large estates, and the same process is still at work at the present day. Some of the statistics relating to the present ownership of the land of Great Britain are of a remarkable character, and show the wonderful difference that exists in the public sentiment of countries so nearly related geographically as England and France. In round numbers the cultivated land of Great Britain, including parks and permanent pastures, amounts to about 47,500,000 acres, and of this *one half* is held by 7400 persons. One-fourth of this amount is actually divided among 1200 owners, giving an average of 16,200 acres each. One-fifth of all the land in the kingdom is held by the members of the House of Lords. The total number of landowners out of a population of over 35,000,000 is only 312,500 persons.

When these statistics are compared with those we have given concerning France, the difference between the land systems of the two countries will be sufficiently evident, but it must be remembered that on the Continent the attention of statesmen has been directed to the question, and the systems adopted reflect to an extent the national sentiment, while in Great Britain the laws have for the most part been made by the wealthy landowners in the interests of their own class. Of late years, however, the attention of political economists has been turned to the subject, and the evils inherent in the present British system are beginning to be more clearly perceived and pointed out. The enormous fortunes poured into the hands of large landowners by the growth of towns and the system of letting land on lease for building purposes have begun to awaken questioning as to whether this

"unearned increment" ought rightly to be wholly absorbed by a limited class, and some reformers advocate the principle that such profit should rather be acquired by the city or township which has caused it, due regard being paid to the original or subsequent expenditures of the landowner. Another point that is causing increasing irritation is the immense extent of land which is set apart by wealthy landowners for purposes of pleasure merely. This is most strikingly exemplified in the immense deer forests of Scotland, where the original inhabitants, the descendants of those who were in earlier times the owners of the land, after being largely reduced to make way for sheep, now see still more searching clearances made in order that the land may be used for purposes of sport alone. The hindrances which the present system of land-holding places in the way of the application of capital to cultivation, the monopoly of mineral wealth by the owners of the soil, and the cumbrous and costly method of land transfer at present prevailing are also subjects which, after long discussion, seem now to be making their way into the public mind, and to call for the consideration of the leaders of the nation. Most thoughtful and competent observers are disposed to admit that the present system works out much better results in actual practice than what would be considered probable if the subject were merely theoretically considered, and while there is ample room for reform there is no need for any sudden and violent change. The beneficial division of unwieldy and encumbered estates, some modifications of the law of entail and of inheritance, and the introduction of a simple and inexpensive system of land transfer could be easily effected, if they were supported by any strong national feeling, and would be sufficient alone to effect great changes in a short period. It has also been proposed that land should always form part of the general assets of the owner, and that there should be no power of making it the security for special debts, as at present can be done by means of a mortgage, a measure which would greatly interfere with much of the present business of the country, but which would certainly bring immense quantities of land into the open market.

With respect to the schemes which have been somewhat noisily advocated concerning the resumption of the land by the "state" and the abolition of private ownership, very little need be said. They proceed for the most part with very little consideration to the history of the past and the experience gained by long centuries of practical experiment. Their advocates do not walk by sight—i.e., the teachings of experience—but by faith, "a faith wild and unreasonable in the imaginary unselfishness of present human nature." No scheme which has the remotest possibility of being capable of actual and useful working has, up to the present, been propounded, that is, if we have to deal with actual men and women, and not with the imaginary creations of speculation; and until this at least is accomplished these communistic theories are hardly likely to obtain any considerable following.

LAND TAX. See TAXATION.

LAN'DAU, a town in the Bavarian circle of the Rhine, 18 miles north-west of Carlsruhe, formerly important on account of its fortifications, which were constructed by Vauban, and removed in 1867, is situated in a beautiful valley on the river Queich, and on a canal, by which provisions, materials for building, &c., are conveyed to it by water. The town is very regularly built within, has two gates, a large parade, a gymnasium, and manufactures of tobacco, calico, woollens, linen, hats, and fire-arms; copper and iron foundries, &c. The population is 7000. The town was held by the French from 1680 to 1815.

LAND-CRAB is the general name for all those species of CRAB which live more or less on land, and have become modified for aerial respiration. The land-crabs belong mainly to the families Gecarcinidæ and Ocypodidæ among

the true crabs (*Brachyura*), but some of the Hermit Crabs (*Anomura*) are also terrestrial in their habits. All such crustaceans as lobsters and crabs breathe by means of branchiæ or gills attached to the bases of the appendages of the anterior part of the body. The free ends of these gills hang in a branchial chamber formed between the sides of the body and the overhanging carapace. It is evident that to enable such animals to live out of water the conditions must be such as to preserve the gills from desiccation. In the land-crabs the branchial chamber is much enlarged, the carapace being much elevated and convex above; below this chamber is almost entirely shut off from the surrounding atmosphere, so that the gills readily retain the moisture brought into the chamber by damp air. The modification from aquatic respiration has gone so far that these crabs can be easily drowned if submerged for any length of time.

Land-crabs are abundant in tropical countries. One of the best known is the Countryman Crab (*Gecarcinus ruricola*), which inflicts great losses on the sugar-planters of the West Indies. These crabs spend the day in their burrows near the sugar-cane fields, and come out at night to suck the juice of cane, of which they are especially fond; they also destroy the young shoots. These crabs have to return to the water to deposit their eggs, since the development of their young is only possible in that element. Once a year, therefore, they assemble in numerous bands, and move in the shortest direction to the sea, without caring for any obstacles. After they have deposited their eggs in the sand below high-water mark they return much weakened and unfit for food. It is said that they block up their burrows during their moult; and while they are undergoing this operation, and are still soft, they are called *Boursiers* (purse-crabs), and their flesh is much esteemed, although it is sometimes poisonous. This quality is attributed to the fruit of the manchineel, of which the people think, falsely perhaps, that the crabs have eaten.

Another land-crab (*Cardisoma carnifex*) inhabits the mangrove swamps of the West Indies, feeding on fruits; but those living in the vicinity of cemeteries are said to burrow down to the dead bodies. If its place of abode be known, the *Cardisoma* is esteemed as a delicacy. Another group of American land-crabs are the Calling Crabs (*Gelasimus*), which are distinguished by the great size of one of the great pincers (*chela*). This big claw they hold up over their heads as they run, and so seem to be beckoning with it—whence the name Calling Crabs. This big claw is of great use in digging their burrows, which extend a foot or more from the surface.

Land-crabs are very abundant on the table-lands of India, especially in the Deccan. Some of these do not descend to the sea to deposit their eggs, but spawn in fresh water. In some species the young land-crab passes through the typical metamorphoses [see CRAB] within the egg, and is hatched in a form resembling its parents; in this case there is no necessity for the land-crab to resort to the water for the purpose of spawning.

LANDES, a department in the south-west of France, takes its name from the French word *landes*, by which the vast sandy plains that extend between the Garonne and the Adour from the meridian of Greenwich to the Bay of Biscay are designated. It formed part of the old province of Gasconne, and is bounded N. by Gironde, E. by Garonne and Gers, S. by Basses Pyrénées, and W. by the Bay of Biscay. Its greatest length from east to west is 72 miles, and from north to south 66 miles. The area is 3599 square miles. The population in 1882 was 301,343. The department is the most thinly populated and also the most sterile in France.

Aspect, Soil, &c.—The lower slopes of the Pyrenees enter the south and south-east of the department, furrowed by many brawling rivers, and subsiding into rich plains

that extend along the left bank of the Midouze and the Adour, which rivers form the general southern boundary of the Landes. To the northward of these rivers, the surface of the ground is covered with a loose ashen-gray sand, overgrown here and there with heath and furze or covered with pine woods. Numerous flocks of wretched half-starved sheep wander over this desert waste, tended by shepherds who walk on high stilts to enable them to pass dry-footed over the marshes that occur in all directions. Clothed in sheepskins, perched on his lofty stilts, and seated on a high staff with a flat broad end, the shepherd of the Landes watching his sheep and knitting woollen stockings, his constant occupation, presents to the stranger an extraordinary appearance. Not only the shepherds, but the charcoal-burners, and almost all the scanty population of the Landes, are accustomed to the use of stilts, on which they walk with astonishing rapidity. The human habitations are of the rudest description, little superior to the huts and wigwags of savage tribes, but the inhabitants are good-natured and hospitable. Maize and barley are grown in favourable situations in this district; but the most important produce of the Landes are the pine forests, which cover nearly one-fourth of the surface, and which, besides the value of the timber and the great quantity of rosin the trees are made to yield by tapping, are found to present a most effectual barrier to the sandhills or *dunes* along the west coast that formerly rolled into the interior under the influence of the western winds, and overwhelmed the villages and crops exposed to their course. The surface of the Landes is rather elevated, as is proved by the rapidity of the river-streams which flow from them towards the south, west, and north-west: the largest of these is the Leyre, which flows north-west into the Bay of Arcachon. The chief rivers of the department are the Adour, which receives numerous feeders from the Pyrenees on the left bank, and its principal tributary from the right bank, the Midouze.

Along the sea-coast of the department, when extended north and south about 70 miles, a marked feature of the country is the sand-hills, which have a width from east to west of 5 miles; their height ranges from 120 to 170 feet; they slope towards the sea at an angle of 25°, and towards the land at an angle of 50°. The form of these masses of sand is continually varying; sometimes they are arranged in regular chains, at others they present a level surface; and not infrequently they assume the form of isolated heaps, the openings between them being called *littes*. The rate of advance of these moving sands was said to be 65 feet yearly. Inside of these is a succession of lagoons (*etangs*), the largest of which is about 7 miles in length; these likewise often change in form, according to the motion of the surrounding sands. About thirty years ago efforts were commenced to fix these sands by planting enormous quantities of sea-pines, until there are now hundreds of thousands of acres of forest trees, which not only effectually retard the advancing sands, but yield resin and timber of great value, while the lands behind are protected from the sea gales. Where thirty years ago a few thousand poor and unhealthy shepherds were walking about on stilts to raise themselves above the unwholesome flats, watching their flocks feeding on the scant herbage found here and there, are now villages with sawmills, wood-working factories, charcoal kilns, turpentine distilleries, and for more than 70 miles are seen these vast forests interspersed with fertile agricultural lands, where farmers and foresters by the thousands are finding a healthy and prosperous existence.

Products.—The department contains 2,261,439 acres. The products, most of which are raised in the territory of Chalosse, as the country south of the Adour is called, are wheat, maize, millet, hemp, flax, madder, saffron, &c. About 10,000,000 gallons of wine are produced annually,

of which nearly a third goes to supply the home consumption; the rest is exported, or distilled and sold as Armagnac brandy. Almonds, plums, and fruits of all kinds are abundant and excellent. Cattle are of inferior breed, ill-fed, and give milk of the poorest quality; the horses are small; sheep are numerous, but their wool is the worst possible; goats, pigs, poultry, and bees are numerous; game and fish are plentiful. Besides the pine, which grows most luxuriantly in the Landes, the forest timber consists of oak, cork, chestnut, and beech.

Mines of iron and bitumen are worked; mica, coal, marble, granite, lithographic stone, chalk, ochre, potter's clay of superior quality, crucible earth, &c., are found. Peat fuel is dug. Mineral springs are numerous. The industrial produce is composed of coarse woollens, pottery, liquors, bar iron and ironware, resin, pitch, tar, glass, paper, leather, brandy, beer, oil, &c. There is also a considerable trade in timber, charcoal, deals, linseed oil, fruits, wool, pork, &c. The department is divided into the three arrondissements, Mont-de-Marsan, St. Sever, and Dax. The chief town is Mont-de-Marsan.

LANDLORD AND TENANT. The word tenant, in the more limited legal sense, which is also the popular sense, is one who holds land under another, to whom he is bound to pay rent, and who is called his landlord. The word land means not only land itself, but also all things, such as buildings, houses, woods, and water, which are upon it. Any one who has an absolute estate in land, provided he is also in possession, may let the land. Where the letting takes place by a contract between the parties the contract is called a lease, the nature of which is explained generally under LEASE. In respect to their duration tenancies are distinguished as being by sufferance, at will, from year to year, or for a term of years. A tenancy by sufferance exists when a person who, having obtained possession lawfully, for a certain time holds over after its termination. In such tenancies possession may be resumed by the landlord without any notice or demand of possession. A tenancy at will implies a letting and holding at the will of the lessor; in which case the lessee is called a tenant at will, because he has no certain or sure estate, and may be put out of occupation at any time by the will of the lessor. He has also at the same time the right to determine the agreement with his landlord when he pleases, and may quit his tenancy by simply expressing his desire to terminate it. A tenancy from year to year is a tenancy for one year certain, and it is constituted where one lets lands or tenements to another without limiting any certain time. Such a tenancy is determinable only by a six months' notice to quit, and such notice must expire at the period of the year at which the tenancy commenced. The latter condition should always be borne in mind, as it carries with it important consequences. Thus, for instance, if a yearly tenancy commenced at Michaelmas, and the holder wished to terminate it at the end of the first or any subsequent year, the notice must be served on or before Lady Day, and if this date be allowed to pass the tenant may be compelled by the landlord to hold the house for another year, as notice cannot be given in any intermediate quarter. The same law applies to the landlord who may wish to give his tenant notice to quit. Leases which are for a specified term come to an end by the lapse of time, and then no notice to quit or other formality is required.

In every case where the relation of landlord and tenant exists certain terms are implied in the relation itself, if they are not modified by express agreement. The terms implied on the part of the landlord are, that the tenant shall quietly enjoy the premises without hindrance from the landlord; on the part of the tenant, that he will pay rent, keep the premises in repair to a certain extent, and use the land, &c., in a proper manner. The rules of law as to the repairs of premises may be determined by the terms of the

lease, and in nearly every case where a lease is granted for years the repairs are the subject of express covenant. If they are not so determined they are somewhat uncertain, and depend upon a variety of circumstances, and also upon the customs of different localities. In agricultural tenancies the lease generally determines the mode in which the farm is to be treated, and, except where it expressly or implicitly excludes the operation of the custom of the country, the tenant is bound to conform to it. The custom of the country means the general practice employed in neighbouring farms of a similar description, with reference to rotation of crops, keeping up fences, and other like matters. It is always implied that the tenant will use the land demised to him in a husbandlike manner, and that he will not exhaust the soil by neglectful or improper tillage.

No tenant, in the absence of an agreement to that effect, is bound to rebuild after accidental destruction of the premises by fire. But under a general covenant to repair and leave repaired, the tenant is bound to rebuild, even in case of destruction by fire. A tenant is also bound to pay rent although the premises occupied are destroyed by fire. In such a case the landlord is still entitled to receive the rent due for use and occupation, and the full notice to quit as if the premises were standing and habitable, and the tenant has no power to compel him to rebuild. But where the landlord has covenanted to keep the house in good and tenantable repair, and it be burned down or otherwise destroyed, the tenant is entitled in equity to relief from rent so long as the premises remain uninhabitable. Where no stipulation is made as to repairing the obligation rests with the tenant, who is therefore liable to do all that becomes necessary.

With respect to fixtures only a very limited right of removal is enjoyed by the tenant over those he has put up. A fixture is a chattel which is let into the soil or united to some other which is let in. In respect to houses the tenant is generally entitled to remove such fixtures as he has put up for ornament of premises or convenience of occupation, and which can be removed with little or no damage to the freehold. Some long lists have been drawn up of articles which have been judged to come under these conditions, and may be found in most legal works bearing upon the subject. A more extended power of removal is granted in respect of fixtures used for purposes of trade, most of which may be taken off by the tenant in the absence of any express stipulation to the contrary. By this rule a distinction is made sometimes between individuals with respect to similar things, a nurseryman being allowed to remove his greenhouses and small trees and shrubs, which a private person would not be allowed to do. In all cases fixtures that are to be removed should be taken away prior to the determination of the tenancy, as after quitting the premises the power of re-entry cannot be demanded. A landlord who has given written consent to the tenant of a farm to erect any buildings and machinery and affix them to the freehold may elect to purchase the whole or any portion at a valuation when the tenant leaves the farm.

The tenant in occupation of the premises is, in the first instance, liable for all taxes and rates of every description due in respect of the premises, and the party, therefore, who is authorized to collect them may proceed against the tenant in occupation to recover them. It is generally a matter of agreement between the landlord and tenant that the tenant shall pay all rates and taxes. One tax, the property tax, is specially excepted from this rule, as this must be paid by the landlord; and if the tenant pays it the landlord must deduct it from the rent. Where there is no agreement to the contrary the landlord is bound also to repay the sewers-rate when required to do so by the tenant. Apart from agreement a rent charge, fixed under the Tithe

Commutation Acts, in lieu of tithes, if paid by the tenant, may be deducted from the rent.

A landlord is privileged above all creditors as to the way in which he recovers his rent, for, in addition to the power of bringing an action, which he enjoys in common with the rest, he has the much more effective and summary right of distraint. Thus, where a fixed rent has been agreed upon, has become due, and is neither paid nor tendered, the landlord, with certain exceptions, can seize growing crops, any kind of stock, goods, or chattels upon the premises, and if the rent remains unpaid he may sell them. The most important exceptions to this rule are those in favour of a trade and of the goods of lodgers who have paid their rents. In favour of a trade the tools and utensils necessary for carrying it on, or in the case of a farm the horses necessary for working the ground, are not distrainable if there is sufficient property of another kind, and the implements of trade in actual use in the hands of the tenant are exempt from seizure. Things delivered to a person exercising a trade by third parties in the way of trade—as, for instance, a watch for repairs to a watchmaker, or goods to a factor for sale—are exempt also, though some rather nice distinctions in relation to this subject have been developed in practice. Formerly the goods of lodgers were liable to distress for the rent due to the superior landlord, but this peculiarly unjust law was repealed by the 34 & 35 Vict. c. 79, and a lodger who has paid his rent to his own landlord is now protected by statute. In cases where the tenant, after the rent has become due, removes his goods to avoid distraint the landlord has power to follow the goods thus fraudulently removed, provided he can do so within thirty days, and take and seize them wherever found as a distress for the rent due, and certain exceptional powers of search and entry are granted. But in order to justify the landlord in seizing goods so removed the removal must have taken place *after* the rent became due, and where the tenant removes his goods before the date upon which the rent is due he may be sued for the amount, but the landlord has no special privilege. Where a tenant becomes a bankrupt or has an execution put into his house the landlord has a preferential claim (protected by his right of distress, which is not affected) to one year's rent, if so much is in arrear; but if more than this is due he must prove under bankruptcy or claim as an ordinary creditor for the remainder. Rent is demandable and payable before sunset on the day on which it is reserved, but it cannot be distrained for on the day on which it is payable, though it may be after sunrise on the day following.

Where a tenant, after giving or receiving notice to quit, continues to occupy, he is liable to pay double rent or double value until the landlord obtains possession.

In Scotland the words landlord and tenant bear the same meaning technically as they do popularly in England. That is to say, a tenant is one who under a contract of lease, written or verbal, holds lands, houses, or other hereditaments under the owner, *i.e.* the landlord, for a fixed term and a stipulated rent. No feudal right can be constituted in this manner. Thus those who in England are termed lord and tenant in copyhold or freehold, would in the analogous Scotch tenures be styled superior and vassal. Leases are, however, heritable property—that is to say, they descend, unless otherwise conditioned, to heirs, not to executors. Verbal leases are good only for one year; for a longer period they must be constituted by writing. Tacit relocation may, however, take place both in verbal and written leases—that is to say, if due notice is not given on either side, the respective rights of landlord and tenant will continue at the termination of the lease for another year. In agricultural leases of not more than nineteen years the tenant has no implied power to sublet or to assign. In urban tenements this power is implied, unless specially prohibited; but the tenant of a furnished

house seems to have no power to assign or sublet. Formerly the landlord held a security, known as the *hypothec*, over the crop and stocking of the farm, by which he could prevent their being laid hold of by other creditors until his rent was paid or provided for; and the landlord of an urban tenement had a similar security over the household furniture, &c., brought into the house, over the utensils and instruments brought into a workshop by the tenant, and over the goods for sale in retail shops. These are termed the *invecsta et illata*. This security or hypothec still exists in urban tenements; but in the case of rural tenements it was thought oppressive, and was accordingly modified by the Hypothec Amendment Act, 1867 (30 & 31 Vict. c. 42), and practically abolished by the Hypothec Abolition Act, 1880 (43 Vict. c. 11).

To prevent tacit relocation, above mentioned, and to warrant judicial removing or eviction, notice must be given to the tenant to remove at least forty days before the term at which the lease determines. The judicial proceedings connected with a removal were formerly very cumbrous. They have now been much simplified by 16 & 17 Vic. c. 80. The time of the notice to quit may be modified or dispensed with by conditions in the lease, and in urban tenements it for a period not exceeding four months one-third of that period is sufficient. Precarious possessors—that is, persons squatting without any legal title—may be ejected, by application to the sheriff, without any previous warning. If a tenant allows his rent to fall into arrear for two full years, deserts possession, or neglects to cultivate his farm at the several periods, he is said to incur an "irritancy," *i.e.* a forfeiture, and may be ousted from possession for the remainder of his lease by the appropriate legal procedure. Sub-tenants stand to the principal tenant as an ordinary tenant does to his landlord; and, generally speaking, no tenant can impeach the title of the landlord under whom he holds. The above are the principal characteristics of the law of Scotland in regard to landlord and tenant. In most other respects it does not essentially differ from that of England. The Scottish law of leases will be found more specially referred to under the title *LEASE*.

LAND MARK, any mark to designate the boundary of land, or any elevated object that serves as a guide to navigation. Among the early Asiatics, Egyptians, and Jews landmarks were in use for distinguishing the common divisions of lands; and the emphatic language used by Moses, "Cursed be he that removeth his neighbour's land mark," is sufficient to show the importance in which these marks were held. Among the Romans they sometimes used boundaries of stones, where figures of the god Terminus were erected. In the middle ages crosses were usually placed to mark the boundaries of land, and sometimes to indicate the character of the soil.

LAN'DON, LETITIA ELIZABETH (Mrs. Maclean), an English poetess, known by the signature L. E. L., was born in Hans Place, Chelsea, on the 11th of August, 1802. She began very early to write verses, and Mr. Jerdan, the editor of the *Literary Gazette*, published some of her effusions in his journal. In her eighteenth year Miss Landon gave to the world a volume of poetry, which included "The Fate of Adelaide," a romantic tale replete with poetic talent. Immediately afterwards she began in the *Literary Gazette*, a series of "Poetical Sketches," subscribed by her initials only. In 1824 appeared "The Improvisatrice," which met with a triumphant reception. "The Tronbador," "The Golden Violet," "The Venetian Bracelet," followed in due order, and maintained the writer's popularity. She also published three novels—"Ethel Churchill," "Francisca Carrara," and "Romance and Reality." From 1831 to 1837 she edited "Fisher's Scrap Book" with much credit. Her poems are characterized by romantic imagery and passionate sentiment, and tinged with the Byronism of the day. In June, 1838, Miss

Landon was married to George Maclean, Esq., governor of Cape Coast Castle, where, having lived happily with her husband for twelve months, she died on the 15th of October, 1839, from an overdose of prussic acid, a medicament she was accustomed to take for the relief of neuralgic pains. In 1841 her friend, Mr. Laman Blanchard, published her "Life and Literary Remains" in two volumes.

LANDOR, WALTER SAVAGE, a versatile and gifted author, son of Walter Landon and Elizabeth Savage, was born on the 30th January, 1775, at Ipsley Court, Warwickshire. He was educated at Rugby and at Trinity College, Oxford, and became an accomplished classical scholar. In 1795 he published in a small volume "The Poems of Walter Savage Landon," and in 1798 the stately poem entitled "Gebir," which was re-issued with improvements and additions in 1803, and which procured for the then almost unknown author the warm friendship of Southey. In 1808, when the insurrection in Spain against the rule of the French broke out, Landon raised at his own expense a body of troops and served at their head for a short time as a volunteer in the Spanish army. In 1811 he married Miss Julia Thuyllier, and after a few years of unsettled wandering he took up his abode at Florence in 1821, where he bought an estate, upon which he continued to reside for the greater part of his life. In 1812 he had published anonymously a tragedy, entitled "Count Julian," and now having settled down in a permanent residence, he produced in quick succession a number of important works. Of these the chief are "Idyllia Heroica" (1802); "Latin Poems" (two vols., 1824); "Imaginary Conversations of Literary Men and Statesmen" (five vols., 1824-29); "The Citation and Ex-amination of William Shakespeare" (1834); "Pericles and Aspasia" (1836); "The Pentameron and the Pentologia" (1837); "Poemata et Inscriptiones" and "Hellenies" (1847); "Last Fruits of an Old Tree" (1853); "Antony and Octavius: Scenes for the Study" (1856); "Dry Sticks Faceted" (1858); "Hellenies Enlarged" (1859); and "Hercule Idylls, with additional Poems" (1863). In addition to the works thus enumerated, he contributed largely to the *Edinburgh* and to other newspapers and journals. His short and pithy articles on the topics of the day being invariably signed with his name. He died at Florence, 17th September, 1864.

In his private life Landon enjoyed the friendship of some of the most eminent among the writers of his time, several of whom have expressed in eloquent terms their admiration of his fine learning and of the nobility and generosity of his nature. But he possessed also an irritable and passionate disposition, which involved him in numerous quarrels and controversies, and sadly interfered with his domestic happiness. According to one of his latest biographers, "He had a genius for the injudicious virtues, and those which stood against their possessor;" but at the same time he was of "a nature passionate, unteachable, but withal noble, courageous, loving-hearted, beautiful, and wholesome to the heart's core."

As an author Landon is chiefly esteemed for his prose writings, his poetry, with the exception of a few pieces of first-rate quality, being nowhere near the first rank. His prose writings have received high praise from many competent literary critics, and his greatest work, the "Imaginary Conversations," from its rare merits of matter and manner, will undoubtedly be preserved among the treasures of the English language. His works have never been in any sense popular, however, and it is hardly likely that they ever will be, for they imply the possession of a large amount of scholarship on the part of the reader, and very much of the charm they possess is derived from subtle reminders only to be perceived by men of culture and wide reading.

The biography of Landon was written by John Foster (1869; new edition, 1871), and a complete edition of his works, with a memoir, was published in 1876 (eight vols.,

London). (See also "Walter Savage Landon," by Sidney Colvin, in "English Men of Letters," London, 1881; and "Selections from the Writings of Walter Savage Landon," arranged and edited by Sidney Colvin, London, 1883).

LAND-RAIL. See CORNCRAKE.

LANDSEER, SIR EDWIN HENRY, B.A., third son of John Landseer, A.R.A., a celebrated line-engraver and writer on art, was born in London, 7th March, 1802. While a child he displayed an extraordinary aptitude for drawing, and his taste was sedulously cultivated by his father, who took him into the fields that he might study and sketch living animals. At the age of ten he was an admirable draughtsman; and at thirteen he began to contribute to the annual exhibitions. In 1816 he was admitted a student at the Royal Academy, and under the advice of Haydon he studied diligently the Elgin Marbles, the animals kept at the Tower and Exeter Change, and made many dissections of different animals, including the body of a lion and those of some other denizens of the menageries. In 1818 an oil painting, exhibited at the Spring Gardens Exhibition, entitled "Fighting Dogs getting Wind," attracted general attention, and being purchased by Sir George Beaumont it served to establish the reputation of the painter and to procure for him many commissions for animal subjects. In 1826, as soon as he was of the prescribed age, he was elected associate of the Royal Academy, and in 1830 academician. For his earliest works he had obtained but small prices, but after his first successes he was able to command large sums for his paintings, and still larger amounts for the right of engraving them. For over half a century he was a constant exhibitor at the Royal Academy, and he maintained his popularity undiminished to the end of his life. Among the more celebrated of his paintings are "High Life and Low Life" (1831); "Sir Walter Scott and his Dogs" (1832); "Harvest in the Highlands" and "Jack in Office" (1833); "Suspense" (1834); "The Highland Shepherd's Chief Mourner" (1837); "Peace and War" and "The Stag at Bay" (1846). In 1850, after a visit to the Continent, he produced "A Dialogue at Waterloo," and the same year he received the honour of knighthood. In 1851 appeared the pathetic deer subjects "Night and Morning," for which a jury of experts awarded him the only large gold medal given to an English painter at the Exposition Universelle, Paris, 1855. In 1860 he exhibited "A Flood in the Highlands," and in 1861 "Man Proposes, God Disposes," and "A Piper and a Pair of Nutcrackers." His last great work, "The Swannery Invaded by Sea-Eagles," was produced in 1869. He died 1st October, 1873, and was buried in St. Paul's.

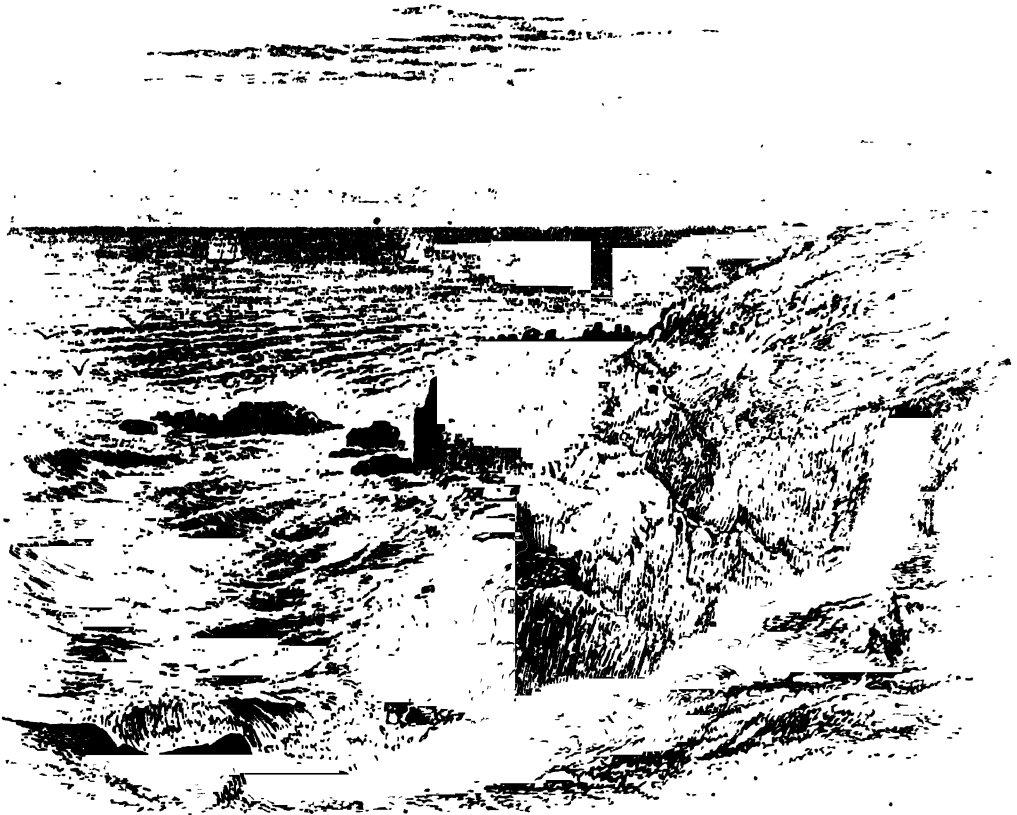
As a painter Landseer possessed an unrivalled mastery of the technicalities and the mechanism of his art, with a facility and dexterity of hand such as few artists have ever attained to. In the zenith of his powers he was known to paint complete, from the first outlining to the last touch of the brush, and of the size of life, a dog and birds, the head and body of a fallow deer, or a fox examining a trap, in about a couple of hours each, and a picture of rabbits, which was exhibited at the British Institution, was painted in three-quarters of an hour. A still more wonderful feat was that of drawing a horse's head with one hand and the head of a stag with the other at the same time. In the expression of animal character he certainly surpassed all his predecessors, and by linking it with some human sentiment, as in "The Highland Shepherd's Chief Mourner" (a picture regarded by many as his masterpiece), he has shown how the incidents of animal life may become susceptible of dramatic treatment and the keenest expression of pathos or of humour. His powers as a sculptor are best attested by the well-known bronze lions of Nelson's monument in Trafalgar Square. A memoir of Landseer, by F. G. Stephens, was published in 1880.

THOMAS LANDSEER, the elder brother of the above, a celebrated engraver, whose beautiful interpretations of his brother's pictures served to make them famous throughout the world, was born in 1796, and died 20th January, 1880.

CHARLES LANDSEER, the second brother, born in 1799, was also a painter of some eminence, his attention being devoted chiefly to historical subjects. He was an R.A., and held the office of keeper of the Royal Academy from 1851 to 1873. He died 22nd July, 1879.

LAND'S END, the ancient *Bolerium*, also called in former times *The Promontory of Blood*, and *Pen-ron-las* ("the end of the earth"), is a celebrated headland forming

the western extremity both of Cornwall and of England, and boldly projecting its bluff stern front into the Atlantic. The terminal rocks rise in a perpendicular precipice of 60 feet of granite above a sea which is never calm. About a mile to the westward lies the dangerous Longships Rock, which is 60 feet in height and covered by a lighthouse 50 feet from base to summit, in $50^{\circ} 4' 41''$ N. lat., $5^{\circ} 44' 41''$ W. lon. Close by this famous promontory is Cape Cornwall, with Whitesand Bay below it, memorable as the landing-place of King Stephen on his coming to England, of King John on his return from Ireland, and of Perkin Warbeck on his fruitless enterprise against the throne of Henry VII. It is here that the Atlantic cable of 1881 is



Land's End.

landed. In 1870 the Wolf Rock Lighthouse, off Land's End, was completed, after occupying seven years, during which time 1736 hours 50 minutes (less than thirty working weeks) were all that could be spent upon the rock.

LANDS'HUT, a pretty town in Bavaria, with 17,225 inhabitants in 1881, is situated on the Isar, 39 miles north-east of Munich, which is here crossed by two bridges. The principal portion of the town consists of two long, broad, and straight streets, connected by a number of narrower ones. The houses are well built of brick, and many of them have gardens. The most remarkable buildings are the palace, the house of the provincial assembly, a hospital, and the parish churches, of which St. Martin's is celebrated for its beautiful steeple, 450 feet in height, commanding a magnificent view over almost the whole plain of Bavaria. On a mountain near the town is the ancient castle of Trausnitz, which was formerly a strong fortress and the residence of the dukes of Bavaria. In the year 1800 the University of Ingolstadt was transferred

to Landslut, but in 1826 it was removed to Munich. There are, however, still a theological college, a gymnasium, a lyceum, and a school of surgery. There are extensive breweries and distilleries in the town, and manufactures of woollen cloths, hosiery, tobacco, paper, cards, and leather, with a trade in corn, cattle, and wool. Landslut is enclosed by old fortifications, and consists of an old and a new town, with a suburb on an island in the Isar. Napoleon defeated the Austrians here, 21st August, 1809.

LANDSLIPS are masses of earth and rock that sometimes slide down the sides of steep hills and mountains, or which fall away from high cliffs and escarpments. In districts where the conditions are favourable for landslips they are often of immense extent, and effect a vast amount of devastation. The conditions most favourable for large landslips are that a friable and pervious bed of rock—either horizontal or slightly inclined outward—should be overlaid by hard compact strata, and rest upon an impervious bed of clay or unctuous rock. In such a case the pervious bed

becomes charged with water and the friable portions are washed away, letting down the superincumbent compact strata, which, when once set in motion, often move for a considerable distance over the slippery surface of the underlying impervious bed, and become split and broken in the passage.

A most remarkable instance of a landslip is that at Axmouth on the coast of Dorsetshire. Here, beneath the chalk, there is a loose sand, which rests on impervious lias clay. This sand, on being washed out, lets down the chalk; the broken masses so let down form what is called the "under-cliff." In 1839 a remarkable phenomenon occurred here; a large tract of country literally moved away, carrying fields, roads, and houses with it. The rent left by this movement was about 4000 feet long by 210 wide and 150 deep. Around the Isle of Wight similar landslips on a smaller scale are frequent. Instances are also to be found inland in several places—as in Derbyshire—throughout the British Isles. Around the basaltic-topped islands of Mull, Skye, and adjoining lands conditions are highly favourable for the occurrence of landslips, as also around the north-east coast of Ireland. In the latter district the pervious bed is the Hibernian greensand, which rests on lias and is overlaid by chalk capped by basalt. One of the most prominent landslips on this coast—but of prehistoric occurrence—is that which forms the picturesque projection of Garron Point, County Antrim.

Landslips are frequently produced by the superficial deposits becoming charged with water on the slopes of steep hills, and becoming softened they slip off the subjacent rock. In the city of Bath a landslip of this character has been in progress for several years. The phenomena of moving bags are allied to this. Earthquakes also cause landslips, and often largely aggravate the amount of devastation.

Of landslips of historic interest from their destructive effects may be mentioned that which occurred at Rossberg, in Switzerland, in 1806, when the whole side of a huge mountain, composed of highly inclined strata, slipped down into the Valley of Goldau, burying four villages, comprising 330 buildings and 457 people. In 1855 an immense mass of material slipped into the Tiber, and dammed back its waters to such an extent that the village of San Stephano was covered to a depth of 50 feet. This was subsequently reclaimed by a drainage-tunnel.

LANDSTURM. See LANDWEHR.

LANDWEHR (*Ger. land- and wehr, defence*), the militia of Austria and Germany. In Austria they are a kind of reserve to each regiment of the line, and drilled once a year under the same colonel. In Germany the army consists of the youth of the empire, from twenty to twenty-five years of age; every subject being obliged to enter into the military service at that age. After three years' service the soldier can proceed to his own home, but for four years is liable to be called upon to join his regiment at every emergency. At the expiration of seven years from the date of enlistment, the men are drafted into the first class or levy of the landwehr, remaining in it until their thirty-second year. In time of war they are liable to be called upon to serve with the regiment of the line of a corresponding number; in fact they form the reserve of that regiment, whence reinforcements are drawn. From their thirty-second to their thirty-ninth year the men belong to the second levy, or *landsturm*, and in wartime their duties, prior to 1875, were limited to garrisoning the fortresses and to home-defence.

The new organization of the French army, however, as finally agreed upon in 1875, was based upon most of the essential features of the German military system, the *armée territoriale* corresponding to the landwehr of Germany. Every Frenchman, with few exceptions, serves from the age of twenty to twenty-nine in the regular army and reserve, is then drafted into the territorial army until thirty-four,

and from thirty-four to forty serves in the reserve of the territorial army, which in many respects agrees with the "landsturm."

The German government was not slow to observe that if Germany meant to retain its proved superiority, a corresponding extension of the national defence must be made, and accordingly the Landsturm Act of 1875 was passed, which provided that all able-bodied men between seventeen and forty-two years of age, not belonging to the army of reserve, may be called in for active service "should an enemy invade or threaten to invade the country." The effect of this measure is to render the landsturm, which previously only garrisoned the fortresses, liable to be sent to reinforce the active army should it at all appear that more than the ordinary landwehr will be required for this purpose. An enormous addition was thus made to the available military force of GERMANY. Russia and several other continental nations, after the war of 1870-71, reorganized their military forces, and introduced many of the German principles of landwehr and landsturm.

LANE, EDWARD WILLIAM, one of the greatest of modern Orientalists, son of Dr. Theophilus Lane, a prebendary of Hereford, was born in 1801. Educated for the church, he abandoned the design of taking orders in favour of the study of engraving; but in 1825, in consequence of weak health, he paid a visit to Egypt, and this visit served to fix his attention for the remainder of his life to Eastern study. He remained in Egypt for three years, and so mastered the language and the customs of the people that in his Oriental costume he was able to pass for a Turk, and in this capacity explore the arcana of Egyptian life. On his return to England his notes on Egypt were shown to the Society for the Diffusion of Useful Knowledge, and he was engaged to complete and prepare them for publication. He accordingly paid a second visit to Egypt, which lasted a year and a half, and on his return he composed his "Account of the Manners and Customs of the Modern Egyptians," one of the finest descriptions of an Eastern country ever written, which was published in 1836. In 1838-40 he issued a translation of part of the "Arabian Nights," with a copious commentary and a mass of valuable notes, and in 1843 a volume of "Selections from the Kur-ân." In 1842 he went again to Egypt, where he spent seven years collecting materials for an Arabic lexicon, and he devoted the remaining years of his life to the digesting and preparing for publication the matter he obtained. Working with a zeal and persistence which would bear comparison with the best labours of the great German scholars, he was able to issue five parts of his work during his lifetime, and to leave two more in MS. which have since been published. The expense of this great work was borne by the fourth Duke of Northumberland, and though not fully completed, this lexicon must be reckoned among the very first of the works of its kind. Lane died at Worthing, 10th August, 1876.

LANE-END is a market-town of England, in the county of Stafford, situated 152 miles from London, being three-fourths of a mile from the Longton station of the North Stafford Railway. It is very near Hanley, and included in the parliamentary borough of Stoke-upon-Trent, from which place it is distant about 3 miles to the south-east. It has a handsome church, large chapels and schools, a subscription library, spacious market-hall, and very extensive manufactures of porcelain and earthenware. The population of the township of Longton and Lane-End in 1881 was 18,620.

LANFRANC, a celebrated ecclesiastic and theologian, thirty-fourth archbishop of Canterbury and first after the Norman Conquest, was born in the year 1005 at Pavia, where his father was a magistrate. He studied rhetoric and law at Bologna, and after visiting many of the different

seats of learning became a teacher of jurisprudence at his native town. He afterwards established a successful school of law at Avranches, but in 1042 he entered the church, and became a monk of the abbey of Bec. In 1045 he was appointed prior, and his fame as a teacher drew so many scholars that the conventual buildings had to be enlarged to accommodate them. Among his pupils were many who afterwards became famous, the most celebrated being Anselm of Lucca, afterwards Pope Alexander II., and Anselm of Aosta, afterwards Archbishop of Canterbury. In the controversy respecting the Eucharist, which arose in connection with a treatise of Berengarius of Tours upon the subject, Lanfranc took a prominent part, and finally issued a treatise of his own in opposition to the exposition of the doctrine given by Berengarius and in defence of the theory formulated by Radbertus. In 1053, having condemned the marriage of William of Normandy with his cousin Matilda, he was ordered to quit the duchy, but as he was setting out on his journey he encountered the duke, and by some good-humoured pleasantry turned his anger into friendship. From that time he became one of William's most trusted counsellors, and after obtaining for him a papal dispensation legalizing his marriage, he was appointed abbot of the newly established monastery of St. Stephen at Caen. In 1067 he was nominated to the archbishopric of Rouen, but declined the office, and after the successful invasion of England was rewarded by the Conqueror with the see of Canterbury. He ably seconded the work of William in the settlement of the kingdom, and never rested until all the English prelates and abbots were removed from power, and their places filled by foreigners pledged to support the king. In his own department he secured to the see more than its ancient primacy, he rebuilt the cathedral, established firmer discipline in the monasteries, and gave great encouragement to learning. He also succeeded in recovering the estates of the see of Canterbury, which had been encroached upon by the king's brother, Bishop Odo. William intrusted him greatly with the affairs of the kingdom, and wrote to him from his deathbed, in Normandy, his last disposition as to it and the coronation of his son. He equally enjoyed the favour of William Rufus, and the more odious tyranny of the latter did not begin until after the death of Lanfranc, which took place at Canterbury, in May, 1089. His collected works, which include some valuable and interesting letters, have been several times published, the latest edition being that of Dr. Giles (two vols. 8vo, 1841). (See also Freeman's "Norman Conquest," Green's "Short History," and Hook's "Lives of the Archbishops of Canterbury.")

LANGLAND, WILLIAM, the poet of the people in the reign of Edward III., who, permeated with the same ideas which animated Wyclif, wrote his immortal poem of the "Vision of Piers Ploughman." Hardly anything is known of him personally save an obscure note in fifteenth-century writing on an early MS. of the poem, which says that Langland was born at Shipton in Oxfordshire, and was the son of a freeman of Lord Le Spenser. Passages in this noteworthy poem show it to be written about 1360. But there are many variations in the MSS., which may be arranged into three distinct versions, all of which tend to prove that the poet was at work upon his poem all his life, and one copy certainly has allusions to the accession of Richard II. (1377). The poem is written in ALLITERATION, never rhyming except by accident. We may give a few lines from the beginning, which run in terms still quite intelligible; the few obsolete expressions occurring being *shope me into shrouds*, shaped me into clothes, i.e. dressed; *sheep*, meaning shepherd; *ferly*, a wonder; *forwanded*, overtired with walking; *sweyred*, sounded; *sweven*, dream or swoon. The metre depends not on the number of syllables but of accents. In each pair of lines there are two in the first of the pair and one in the second; the number of unaccented syllables varies, but is

usually eleven in the two lines together. The three accented syllables must begin with the same consonants. Thus—

"I *shope* me into shrouds—As I a *sheep* were,"

runs upon the consonant *sh*. The following short extract is from the beginning of the poem, the spelling being modernized:—

"In a summer season—When soft was the sun,
I *shope* me into shrouds—As I a *sheep* were,
And on a May morning—On Malvern-hills,
Me befel a *ferly*—Of *faery* methought.
I was weary forwandered—And went me to rest
Under a broad bank—By a burn's side;
And as I lay and leaned—And looked in the water,
I slumbered in a sleeping—It *sweyved* so merry.
Then gan I to *meten*—A marvellous *sweven*,
That I was in a wilderness—Wist I never where."

Chaucer in these very days was writing his wonderful "Canterbury Tales," so full of fresh jolly grace; and just as the courtly poet crowded his canvas with the well-to-do figures of the pilgrims so did this preacher in verse, this mouthpiece of the bitter lot of the poor, bring into his dream the traders of the villages, the solitaires in the caves and dells, the "japers and jinglers," beggars and friars, labourers and toilers at the plough like himself (in his assumed character) who,

"In setting and sowing—Swonken full hard."

(*Swonken* = toil.) In another thing, too, he is like Chaucer: we know most of his personal aspect from his own pages. He tells us how he came up to London as a priest in minor orders, and earned a miserable pittance by chanting at funerals; and how he hated the haughty well-clad folk of the great streets, and cast in his lot with the poor. He was held for a madman, he bitterly says. The crushed and bruised common people are his subject; he is too possessed with it for fancy or simile; his work is not so much poetry as an agonized cry in verse; and its latest issue came the year before the peasant's revolt which we know as headed by Wat the Tyler. Nevertheless, anyone who feels for the poor is fascinated by this old poem, in spite of its lengthy paraphrases of Scripture, its cumbersome allegory, its "moralities": it flashes with a grim earnestness from the heart of that gloomy man, who lived five centuries since, straight into one's heart now, and one walks the Chepe-side with the angry clerk filled with a burning indignation like unto his.

The search after truth, which is the subject of the poem, is led by one Piers or Peter, a simple ploughman. He, with the directness of one always face to face with nature, preaches the absolute equality of all men in their manhood:—

"For in charnel at church—Charles be evil to know,
Or a knight from a knave there—Know this in thy heart."

It is indeed *evil* (difficult) to know a churl from a knight in a charnel (tomb). Not that the inspired ploughman desires the ease and idleness of the knight, but only fair dealing without tyranny or cheating. For, says he, hunger is God's tool to bring idlers to toil, and

"I warn you, workmen—Win while ye may,
For hunger litherward—It steth him taw."

With the dignity of labour we find him advocating the bitterness of a good life before all the absolutions of the church—a strong touch of Wyclifism. The pictures of the life of the people of his day are invaluable. Here is the lot of the poor farmer shown with the fidelity of a photograph:—

"I have no penny, quoth Piers—Pullets for to buy,
Nor neither geese nor grys—But two green cheeses,
A few curds and cream—And an oaten cake,
And two loaves of beans and bran—Baked for my children.
I have no cooked meat—By Christ—Collups for to make,
But I have parsley and porrets—And many cabbage plants,
And eke a cow and a calf—And a cart-mare
To draw afield my dung—While the drought lasteth."

(*Grys* are pigs; *porrets* are leeks.) At Lammas-tide (August) he says he hopes to get harvest, and then hunger will feed gluttonously and go to sleep. It was a matter of course to be hungry till harvest.

LANGOBARDS or **LONGOBARDS**. See LOMBARDS.

LANGPORT, a market-town of England, in the county of Somerset, 153 $\frac{1}{4}$ miles from London, stands at the junction of the Yeo and the Parret, on the slope and at the foot of the hills which overlook the marshy flats adjacent to these rivers. The principal street descends a considerable slope to the Parret, over which is a handsome bridge of three arches. There are several other bridges or arches, either over arms of the river, or designed to allow a passage to the waters in the time of floods. The town is connected by railway with Yeovil and the Great Western system. A small suburb, lying west of the Parret, is called Langport Westover, to distinguish it from the principal part, Langport Eastover. The church is ancient, with a fine western tower. Huish-Episcopi Church, close at hand, is also remarkable for its noble tower. There are a neat guildhall and grammar-school. The population of the parish of Langport Eastover in 1881 was 897.

LANGRES, a town in the French department of Haute Marne, which takes its name from the Lingones, an ancient Celtic tribe whose capital it was, is situated at a distance of 186 miles south-east from Paris, and in 1881 had 8117 inhabitants. The town, built on the watershed between the Mediterranean and the Atlantic, occupies a higher site than any other town in France, except Briançon, being 1550 feet high. It is pretty well built, with wide streets, and is ornamented with fountains and promenades. The most remarkable structures are the cathedral, the town-hall, and a Roman triumphal arch, which makes part of the town wall. The greatest ornament of the town is the promenade called *Barbce-Fontaine*, which is formed of an avenue of magnificent limes, nearly a mile in length, and terminates in a majestic vaulted arcade, from the top of which a colossal frog in bronze continually spouts a mass of water that feeds several basins and jets. The town has been converted into a fortress, owing to its importance in a military point of view, as commanding the passage from the valley of the Seine into that of the Seine. The citadel was built by Louis Philippe, and four detached forts were erected in 1868. The chief manufacture of Langres is cutlery; there is also a considerable trade in corn, flour, wine, Pax, hemp, wool, &c. The town, which gives title to a bishop, is the seat of tribunals of first instance and of commerce; it has two ecclesiastical schools, a college, a school of geometry, and three hospitals. A great number of Roman antiquities have been found near Langres.

The Lingones are noticed by Cæsar as being attached to the Romans ("De Bello Gallico," l. 26, 40); they afterwards became *federati*, or allies of the Romans; and their city is characterized by Frontinus as *opulentissima* (lib. iv. cap. 3). It suffered numerous disasters in the dark ages, being taken and burnt by Attila, and again destroyed by the Vandals in 407. Louis VII. annexed it to the French crown. Diderot was a native of Langres, where he was born in 1712.

LANGTON, STEPHEN, an illustrious English churchman, was born about the middle of the twelfth century. The place of his birth is unknown, but he came of a Yorkshire family, and had already been made a prebendary of York when he proceeded to Paris to study theology and philosophy. In both subjects he attained to considerable eminence, and when his friend and fellow-student Lothario, nephew of Clement III., became Pope Innocent III., he invited Langton to Rome and made him a cardinal. Soon afterwards the see of Canterbury became vacant. The late primate had been foremost in joining the Earl Marchal to prevent King John squandering the

blood and treasure of England upon an attempt to recover his lost continental provinces. John now saw, as he thought, his chance for overcoming this dogged national spirit which had grown up in the English clergy and foiled his designs. He commanded the monks of Canterbury to elect John de Grey, bishop of Norwich, as their head, an election which would in due course make him archbishop. They elected De Grey, and he was enthroned as primate. But they did not tell the king until later that they had already elected their subprior, Reginald. The latter appealed to Rome, and the primate-elect met him with a counter appeal. Innocent summoned the monks themselves to Rome, annulled both elections, and commanded them there in his presence to elect Cardinal Langton. This they readily did; and the Pope's choice was an excellent one; but the assumption was so arrogant and unwarranted that John has for once our sympathies in his lively indignation at the Pope's interference, and in his refusal to permit Langton to occupy his see. The Pope threatened an interdict, and John replied that he would banish the clergy in a mass. The interdict fell upon the land in 1208. All worship but that in the convents, all sacraments but baptism ceased, and even the dead lay unburied. John on his side was as good as his word; he confiscated the lands of the clergy who observed the interdict, and welcomed those who harmed or even killed them as his friends, refusing to punish them. In 1210 the Pope passed to the further sentence of excommunication, and the few clergy who had held to John now wavered. He crushed the Archdeacon of Norwich under a cope of lead when the news of his disaffection became known, thinking thus to terrify others into loyalty. Those who could not escape from the kingdom feared to oppose the tyrant. Innocent was still defied. Therefore in 1212 he sent a legate to proclaim John's deposition, summoned a crusade against him as the enemy of Christendom, and placed at its head the King of France. John contemptuously received the legate and heard his communication; and as for the French king he sent across a fleet which effectually scared him by capturing his vessels and burning Dieppe. But at this moment news reached the king in his very triumph that the King of Scots, the Prince of Wales, and large numbers of the baronage were corresponding with the King of France and the Pope and promising aid. For the time John felt he was beaten, and he hastened to submit before the storm broke. His surrender was as shameful in its provoking abasement as his defiance had been insolent. He yielded his crown to the legate, and received it back at his hands. Langton reached England in July, and performed his first act as archbishop by relieving the king of excommunication. John now developed the schemes of French conquest, in order to prosecute which he had submitted to the shame of submission. A crushing defeat of one of his armies threw him back on England baffled. Had he won instead of lost at Bouvines we should have been without Magna Carta. But now, as soon as the news came over, Langton, standing forward as the leader of the friends of English liberty, summoned the barons together to consider their conduct towards the king. Led by the patriotic archbishop, they agreed to extort some pledges of good government from the tyrant in his hour of distress; and that the more willingly as John had let it be known that on his return from France all who had corresponded with the Pope in the previous half-smothered revolt should feel his vengeance. They assembled in St. Paul's, and Langton produced a copy of the charter of Henry I. which that king had issued on his accession, and wherein he promised to abandon the evil ways of the Red King (which the tyranny of John had closely imitated), following instead the ancient English laws of Edward the Confessor. This charter and those ancient laws the primate held forth as the basis of a definite agreement to restore the lost liberties of the country. Upon

John's return it became necessary to act, and the barons met Langton therefore at St. Edmund'sbury, under presence of a pilgrimage; and all swore, on the high altar of the abbey, to stand truly together and to protect the cardinal archbishop. At Christmas they came in arms to the king, and long and weary negotiations followed, which the false king protracted till he found he had no friends beyond his court. The barons had seized London and Exeter and Lincoln, and the "army of God and holy church," as they styled themselves, was on the point of marching against him. Men ran from him to his opponents until he had not ten knights left by his side. He stood practically alone. Once more he submitted to necessity, and the Great Charter (*Magna Carta*) was signed at Runnymede, Windsor, on 15th July, 1215.

But John had made himself a vassal of the Pope, and he had a right under feudal arrangements to the support of his liege lord. He appealed to Innocent, and the thunders which had been fulminated against John years before were now hurled against his barons. The Pope summoned Langton to Rome and suspended him from his functions. He annulled the Great Charter. But things were now altered. Deposing an archbishop who had been thrust into his see by a tyrannous king, or a king who was hated by all his subjects, had been possible to Innocent. It was not possible to coerce the real nation. His exiles fell unheeded, his excommunications were disregarded, and the clergy went on as if nothing had happened. They met, and decided that as no ecclesiastical offence had been committed they were justified in disobeying Innocent, for "the ordering of secular matters appertaineth not to the Pope." Though Langton was at Rome it was his brother who headed the clerical revolt in London. Then came the civil war, the first successes of John, the landing of the French, his hurried march back to meet them, his fever on the march, and his death. With a new king there was no excuse for withholding Langton from his duties, and he was allowed to return and resume his see in 1217. His commanding authority was sadly needed, and it is greatly due to him that the distracted kingdom soon returned to order. In September he presided in the council held at London, where *Magna Carta* was solemnly confirmed and enlarged, and in 1220 he crowned Henry III. His closing years were occupied chiefly with incessantly guarding the charter, and with ecclesiastical reforms. In 1225 he established the great constitutional principle, that the redress of wrongs precedes a grant to the crown, by refusing to decree a subsidy (the barons backing his action) till the charter had been enlarged and again confirmed. His services to English liberty can scarcely be over-estimated. He was one of the greatest of our patriots. He died at Shudon in Sussex, 9th July, 1228. He was a learned and eminent theological writer, but most of his writings are lost. He is said to have been the first to divide the Bible into chapters. (See Hook's "Lives of the Archbishops of Canterbury," Freeman's "History of the Norman Conquest," and Pearson's "History of England.")

LANGUAGE is the means of expression of human thought, whether by gesture, by written signs or pictures, or by speech—the last being infinitely the most important. The language of written signs or pictures, and the language of speech, are limited to mankind, the language of gesture is that which connects him with the rest of the animal creation.

But there is a difference between the language, even the language of gesture, used by man and that of the brutes, so vast as to appear to many to be radical. Darwin and others have, however, successfully laboured to show that the gestures of the higher animals clearly show reasoning powers to some degree. The possession of the faculty of speech has raised man, in the greatest measure, to his present mental superiority over the brutes. There are, or

were, two schools of philosophers upon the origin of speech. The one school affirmed that man, having the necessary organs, invented speech, and so became a thinking soul by its help; the other affirmed that man's mind is due to the gift of speech. The question may be roughly put, "Did speech make thought, or thought make speech?" The answer is now seen to be—*neither*, and also *both*; for the two act mutually upon one another. Sir William Hamilton first pointed out that as in a tunnel, though the brick arch does not supersede the excavation, yet the excavation must remain rudimentary were it not for the brick arch; so with thought. It may and can exist (as in animals) without spoken language, but without speech it never advances beyond the merest rudiments.

Language, then, using the word as synonymous with its most important form—that of *speech*—consists of vocal sounds. Any sounds are a component part of language which produce in the hearer the counterpart of that mental state of which these sounds are the material and sensible signs. But language presents great varieties; and though all languages have many sounds in common which are universally significant and intelligible, the greatest part of the sounds composing any given language are only intelligible to those who from long experience have become familiar with them. This fact does not affect the definition of language. If any two human beings can by vocal sounds mutually convey to each other their desires, thoughts, and conceptions, this possession of a common power and capacity constitutes the possession of a common language. When this power and capacity are common to a considerable number of persons living in a community, the exercise of them constitutes and makes a national language.

A language, then, must be viewed as the totality of the vocal sounds by which the members of any given society communicate to one another their ideas. As action or motion of the body and its parts, and the application of the bodily powers to various purposes and ends (which constitute the language of gesture), are the signs and expressions of the sensations and of the will—the result, as it were, of the moving power within—so spoken language, which is itself in its material character nothing more than a corporeal act, is another mode of expressing the same thing. But language is also the expression of our intellectual and judging faculties; and its form is therefore necessarily subordinate to the laws of the human mind.

Spoken language can do more than the language of gesture, which can only express desire, will, purpose, design, but cannot express many of those things which only exist as conceptions of the mind, or are only modes and forms in which the mind, according to its laws, views things and the relations of things. Language, therefore (spoken language), in addition to its power of expressing what can be expressed by other corporeal signs, has a peculiar power of conveying from one person to another notions as conceived by the mind, which have no actual existence, or can only be mentally conceived to exist. The degree in which language is capable of doing this depends on the mental cultivation of the people who use it; for without such cultivation language is not wanted for the expression of many notions, and unless preceded or accompanied by such cultivation such part of language cannot exist. The language of many nations may be so poor as to convey very little more from one person to another than can be conveyed by other corporeal signs; or a very few sounds and combinations of sounds, aided by other natural signs, may be sufficient for all the purposes of social existence. But even in the poorest languages many general terms are required to express the meaning of a speaker when the objects referred to are not present, and there is no language which does not contain a considerable number of abstract terms, indicating not only things and qualities which are the objects of a sensuous intuition, but

also those which are the objects of a non-sensuous intuition. Every language also must, to some extent, express the mode in which the mind contemplates the relations of things.

The matter, then, of which language consists is vocal sounds expressive of ideas: its form is the relation of those sounds to one another, which is expressed (within certain limits) chiefly by their arrangement. In order that the several sounds may convey the same meaning, the same sounds must be used for the same purposes—that is, the meaning of any single sound must, generally speaking, at least for any given epoch, be fixed. The arrangement of the vocal sounds must also be tolerably well fixed, in order that the same set of sounds may convey the same meaning.

Even in many of the simplest sentences, consisting only of two or three words, every, or nearly every, language has a definite order for expressing one meaning by such words, and another order for them when they are to express a different meaning. Sometimes the difference of meaning may be conveyed by the greater or less stress laid on a particular sound, or by some change in the intonation of voice, which is in effect a change in the sounds, and therefore all that is necessary to mark a difference. This power which spoken language possesses gives it one advantage over written language, in the use of which we are sometimes obliged to use supplementary signs or marks to express what the voice can more surely effect.

If we analyze the vocal sounds of a language, we can separate them into two chief classes—sounds which of themselves convey a notion, and may therefore be called *notional*, such as “man,” “horse,” “virtue,” “vice,” “room,” “walk;” and sounds which only serve to connect notional words and to indicate the relation between and among them, and may therefore be called *relational*, such as “from,” “to,” “who,” “which.” Many of these relational words, perhaps all of them, may once have been notional; and their precise meaning and value, in the case of languages no longer spoken, can only be determined by tracing them to their origin, or to such source as we are compelled by want of other evidence to consider as their origin; but this is no objection to our statement of what a language consists as an actual phenomenon. The actual meaning of all the words which compose a language must be determined by their actual use. Their former meaning and their history must be determined by a reference to the language as formerly used, the evidence of which use is the written language.

The various modes of recording language, or the representations of marks by the aid of which sounds can be at any time reproduced equivalent in meaning to those by which the writer would have orally expressed what he has expressed, by signs or marks on paper, or any other durable substance, make what we call *writing*. It will be sufficient at present to observe, that the mode in which the sounds of any given language are represented must not be considered as necessarily indicating anything particular in the language itself.

It is difficult to conceive that any words at first were more than monosyllabic sounds; at least, so far back as we can trace any known language, such seems to be the only result. By this it is not meant to say that a syllable is one simple sound, but that the monosyllabic sounds here meant are such as in their integrity expressed one notion distinctly and one only, that every part of the sound was a necessary part of the meaning, and that no part of the sound was derived from the union of another sound with it. Thus the whole of a language would consist of vocal sounds, every one of which had its distinct meaning in itself. But spoken language is favourable to the agglutination of sounds, and particularly of those which come into juxtaposition in such a way as to readily unite. Thus, to adopt for the purpose of convenience the names now used, the verb and its pronoun, the words, *refusing a place* or an object, and the word

expressing some relation to that place, and other similarly situated words, would respectively form combinations; and thus would arise the phenomenon, which we observe in most languages, of words reducible to various elements, some of which in their simplest form are notional terms, and some which, taken by themselves, convey no meaning at all, but by virtue of their union with the notional term modify and qualify it.

If the language of a nation were committed to writing in a very early state of its progress, it seems probable that the simple elementary forms would be kept much more distinct than in languages which have not been committed to writing except in a more mature form. Thus the mass of the words would be of the monosyllabic class, and the adoption of distinct symbols for the representation of each sound would seem almost necessary. It must have been in the attempt to represent in writing some of the languages which had been cultivated by longer use, and improved by social and intellectual development, that the discovery of the mode of representing all the sounds of a language by an alphabet originated.

Some languages, as the Greek and the Latin, and, to a considerable extent, the German, express many relations between the various notions contained in any set of words, by means of certain variations in the forms of the words themselves, which variations mainly occur in the terminations of such words. Thus the whole meaning intended to be expressed by the words “*Homo bovem ferit*” may be indicated by any arrangement of these three words. Some languages, of which the English in its present form is an example, have little power of expressing the relation of ideas by any change in the terminations of words; and accordingly they express notions by one set of terms, and relations by another set of words. Such languages are necessarily more limited as to the power of varying the order of their words than languages of the class above referred to. See **INFLEXION**.

That part of language which treats of single words and their varieties of form is called **ETYMOLOGY**, and is one of the divisions of **GRAMMAR**. Etymology also comprehends the notion of historically tracing the successive forms which the words of a language have had, of separating them into their elementary parts, and then comparing the words, thus reduced to their simplest forms, with the corresponding words and forms in languages known to be related, in order to establish the relationship, that is, the ultimate identity or unity of words in the languages compared.

That part of language which treats of the arrangement of the words composing a sentence, and of the modifications in form of termination to which such words are subjected in consequence of entering into that combination which constitutes a sentence, is generally called **SYNTAX**. As etymology has its general principles, so has syntax; but each language has also its proper syntax.

Within the present century, the study of etymology has been pursued on sound principles and with corresponding success; and the various and apparently capricious sounds of language have been shown to be governed by laws, within limits as strict and invariable as those to which matter in general is subjected. This improvement has been owing in a great measure to the comparison of many languages with each other (“comparative philology”), instead of confining the field of observation to one or at the most two or three tongues. Nothing has perhaps contributed to this improvement more than the study of the Sanskrit, a language which bears so striking a resemblance, both in its more important words and in its grammatical forms, to the Latin and Greek, the Teutonic and Slavonic languages, as irresistibly to lead to the conclusion that all must have been derived from a common source. The great similarity of all these languages, and their contrast to the Hebrew, Arabic, and other Semitic tongues, has led to the

use of the term "affinity of languages," by which is meant that all those languages which employ the same sounds to express the most simple ideas, and adopt the same mode of grammatical inflexion, must originally have been one and the same language, or derived from some primal language. We do not regard English as derived from Greek, and Greek from Sanskrit, but the whole three as coming from a primal Aryan source, Sanskrit retaining most of the original characteristics, Greek being more worn, and English very much more worn still, so that the affinity is often hard to trace. Many English words, such as *inspect*, *corporate*, *communicate*, *detrimment*, are doubtless derived directly from the Latin; while others, such as *astronomy*, *geography*, *geology*, have been borrowed directly from the Greek, or manufactured according to settled analogies; but such words as *know*, *lick*, *break*, *yoke*, *sit*, and numerous others, are common to the English, Sanskrit, Latin, Greek, and Slavonic tongues; and it might be said, with as much truth, that the Sanskrit *juh*, or the Greek *gignōskō*, are derived from the English *know*, as that the English word comes from the Latin.

The origin of language for the race has been guessed at above; the origin in the individual needs no guessing, for it occurs daily under our eyes. We thus observe the startling fact that a language is learned entirely afresh by every individual. Probably a Hottentot baby will have a throat hereditarily adapted to express those peculiar, and to us distasteful, clicks and snorts which render that tongue the despair of missionaries, while an Italian baby would more readily be inclined to pour out the sweet melody of pure Tuscan; but, these vague tendencies apart, there is no such thing as an hereditary language. Shut a child in a cellar and it would never learn to talk—there have been such cases recorded. Leave an English infant in a French family and it grows up a thorough Frenchman, not knowing a word of English, if English has not come in its way. Further, the English of a farm laborer is a very limited speech, of about 300 words, all told—the mere rough centre and core of a language such as that wielded by Macaulay or by George Eliot; and this latter remains to him, except after severe mental toil, a sealed speech. Again, the talk of the Yorkshireman is very hard to understand for the Somersetshireman, from peculiarities of pronunciation which each sees clearly in the other, but is ignorant that he himself possesses. Yet a Somersetshire child taken to Yorkshire will speak the northern, not the southern speech.

The list of those who have had a knowledge of more than ten languages is a very short one. Mithradates, Pico of Mirandola, Jonadab Albanus, and Sir William Jones are stated to have passed the limit of twenty languages: the first two twenty-two, and the last two twenty-eight. Muller, Niebuhr, Fulgence, Fresnel, and perhaps Sir John Bowring, are usually set down as knowing twenty languages. For Elihu Burritt and Cosma de Kőrös their admirers claim eighteen. Renaudot, the controversialist, is said to have known seventeen; Professor Lee, sixteen; and the attainments of the older linguists, as Arius Montanus, Martin del Rio, the converted Rabbi Libettas Coninetas, and the Admirable Crichton, are said to have ranged from fifteen to ten or twelve.

The remarks in this work under the different letters of the alphabet, A, B, C, &c., will show in what manner the forms of words in languages of the great Aryan family should be compared.

The science of language has been most ably pursued in Germany, and also in France. Englishmen were comparatively late in the field. The most recent authoritative works on the subject in English are, Marsh's "Lectures on the English Language" (New York, 1860); Latham's "Elements of Comparative Philology" (London, 1862); "Outlines of Philology" (1878); Professor Max Müller's

"Lectures on the Science of Language" (London, 1864). The researches of the latter gentleman have contributed more perhaps than anything else to popularize the study of the science in Great Britain. Whitney's "Life and Growth of Language" (London, 1882) is a very clever general treatise. Papillon's "Manual of Comparative Philology" is the Oxford treatise (Clarendon Press Series, 1877); Professor Sayce's work with the same title bears date 1874.

LANGUE D'OIL, LENGUA D'OC. In Gaul the popular Latin (quite a distinct idiom from the classical Latin of Horace or Cicero) fell into the hands of two rival races, one in the north and the other in the south. The word for *yes* (which in modern French is *oui*) was in the northern language *oil* and in the southern language *oc*, whence the first was called *la langue d'oïl* (the tongue of *oil*), and the second *la lengua d'oc* (the tongue of *oc*). The latter is preserved by name in the province of Languedoc, and very largely exists yet in what we call Provençal and Gascon speech, the local idioms of southern France. The ancient dividing line would have roughly lain along from La Rochelle to Grenoble. The *lengua d'oc* had a brilliant literature for two centuries; it was the tongue of the Troubadours, but in 1272 Languedoc became French, and the great "tongue of *oc*" sank to the level of a country speech before the claims of its stronger northern rival "of *oil*." It was more distinctively Latin than the *langue d'oïl* (the parent of modern French), that is, nearer to Italian and Spanish, richer, more melodious, but less crisp, vigorous, and fresh. The *Troubadours* of the south distinctly preceded, and served as models to the *Trouvères* of the north. A large quantity of ancient Provençal poetry fortunately remains to us.

LAN'GUEDOC, an old province of France, which now forms the departments of AUDE, TARN, HÉRAULT, LOZÈRE, ARDÈCHE, and GARD, together with the arrondissements of Toulouse and Villefranche in HAUTE GARONNE, Castel-Sarrasin in TARN-ET-GARONNE, and Pay and Ys-singaux in HAUTE LOIRE. Under the Romans it formed part of Gallia Narbonensis, and on the decline of their power it had the name of Septimania, from its seven bishoprics—viz. Toulouse, Béziers, Nîmes, Agde, Maguelonne, Lodève, and Uzès. The Emperor Honorius ceded the territory of Languedoc to the Goths, who held it for nearly 200 years, when they were driven out by the Suiacens, who in their turn were expelled by Charles Martel. The country thus subjected to the kings of France was governed by feudatory dukes and counts till 1270, when, on the death of the last Count of Toulouse, it was united to the crown of France.

The name Languedoc has been transferred to the country from the name given to the language of the inhabitants, who used the word *oc* as an affirmative, and were hence said to speak the *lengua* or *langue d'oc*, as distinguished from the dialect spoken north of the Loire, which expressed the affirmative by *oïl*. [See **LANGUE D'OIL**.] The name *Occitania*, sometimes applied to the country, is said to be derived also from *oc*.

The province extended from the Rhône to the Garonne, the most western point reaching the junction of the Tarn with the last-mentioned river. It was bounded N. by Auvergne and Lyonnais, E. by Dauphiné and Provence, S. by Roussillon and the Mediterranean, and W. by Guienne and Gasconne. It was formerly divided into Haut Languedoc, Bas Languedoc, and Cévennes, which had Toulouse, Montpellier, and Alais for their capitals respectively.

LAN'GUID or **LANGUAGE**, part of an organ flue-pipe. See **ORGAN**.

LAN'TIDÆ. See **SHRIKES**.

LAN'NER (*Falco lanarius*) is a FALCON, inhabiting South-western Asia and South-eastern Europe. Formerly

the Lanner was held in high esteem for falconry, being imported from Asia for that purpose. It was usually flown at kites, with which it was better able to cope than its smaller congener, the Peregrine Falcon. It differs from the Peregrine in the fact that neither age nor moulting causes any change in its characteristic marks. The male is smaller than the female, and was called Lanneret by the falconers.

LANSDOWNE, an elevated pastoral district of England, in the county of Somerset, 2½ miles north-west of Bath. In the neighbourhood there are many Druidical remains.

LANSDOWNE, HENRY PETTY-FITZMAURICE, third Marquis of, an English statesman, was born at Lansdowne House, London, in 1780. He received his early education at Westminster School, and was sent for a period to Edinburgh, and placed under the tuition of the celebrated philosopher Dugald Stewart. Edinburgh was then a nursery of intellectual and political Liberalism. Lord Henry afterwards proceeded to Trinity College, Cambridge, where he graduated M.A. in 1801, and in the following year entered Parliament as member for Calce. He turned his attention to finance, and on Pitt's death, in January, 1806, he became chancellor of the exchequer in the administration of Lord Grenville. At this time he represented Cambridge University, and from 1807 till his succession to the marquise in 1809 he sat in the House of Commons as member for Cambridgeshire. He was one of the leaders of the Whig opposition in the House of Lords till 1830, when he accepted office under Lord Grey as lord president of the council, which office he held in both the ministries of Lord Melbourne, and again under Lord Russell from 1846 to 1852. He then resigned office, and also the leadership of the House of Lords, which he had held since 1841; but consented to hold a seat without office in the Aberdeen cabinet, and again in the last administration of Lord Palmerston.

During his long political career the Marquis of Lansdowne consistently advocated those various measures of progress and reform which he lived to see triumphant. He was a liberal patron of literature, science, and art. The poet Moore, in recognition of long kindness, dedicated to him the collected edition of his works. Lord Lansdowne died at Bowood, on 1st January, 1863. He left a splendid library and one of the finest collections of pictures and statuary in the kingdom. Had he been ambitious he might have been prime minister more than once, and he is known to have refused a dual coronet.

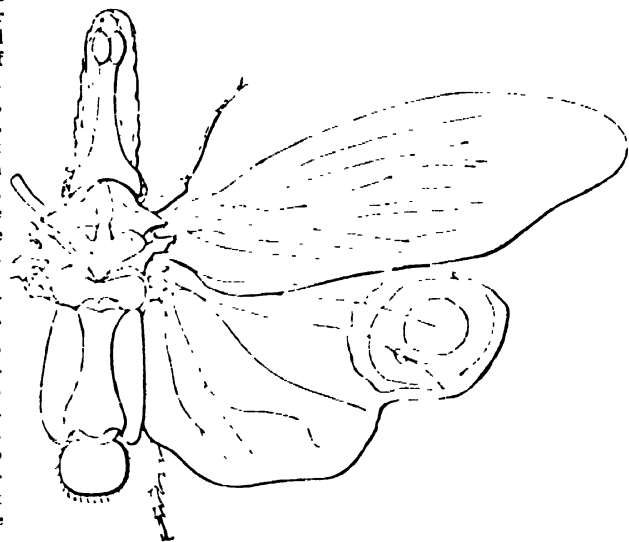
LANTERN, in architecture, is a closed figure made up of windows, sometimes arranged round a circular, sometimes an oval, more frequently a polygonal space, so that it may fairly be likened to a lantern. Such a structure usually crowns a dome and gives light to its vast curves, as in St. Paul's, or it may rise from a tower, or from a large space as at Ely, or from the midst of a timbered roof, as in the London Guildhall; and in any case it serves always to give to both the interior and exterior one of the most effective finishing touches in the range of architectural details.

LANTERN, MAGIC. See MAGIC LANTERN.

LANTERN-FLY is the name given to a species of insects of the genus *Fulgora*, from the belief, now discredited, of their luminosity.

The genus *Fulgora* is the type of the family Fulgoridæ, which is placed in the suborder HOMOPTERA, order HEMIPTERA. In this family the short three-jointed antennæ are placed under the eyes, and there are two ocelli present. The hind legs are usually formed for leaping.

Most of the species, both in the larval and perfect condition, produce from the skin a waxy secretion, which collects on the abdomen in white powdery patches, and frequently forms projecting thick white threads. In the genus *Fulgora*, and some other genera, the front part of the head is produced into an irregular inflated process; from which "lantern" the phosphorescence was said to proceed. Madame Merian, in her work on the insects of Surinam (first published in 1705), stated that the South American species (*Fulgora lateruaria*) emitted such a brilliant light in the dark that she was able to read by the light of one only. Other species of the same genus were supposed to have the same power; and this has been distinctly asserted of the Chinese Lantern-fly (*Fulgora candelaria*). Competent naturalists have since, from their own ob-



Fulgora lateruaria—Wings on one side removed.

servation and from the evidence of the natives, shown that neither of these insects possessed any luminosity; and the positive statements of Madame Merian, after having for long excited considerable controversy among zoologists, are now finally discredited.

The Great Lantern-fly (*Fulgora lateruaria*) is nearly 3 inches long, and its outspread wings measure 5 or 6 inches; the lantern is nearly an inch in length. The general colour is yellowish-brown. Each hind wing has on its outer margin a large orange "eye" inclosing a bluish patch. The Chinese Lantern-fly (*Fulgora candelaria*), fig. 13 in the Plate HEMIPTERA, is a well-known form; few cases of insects reach Britain from China in which it does not form a part. It has a red body, with the fore wings green with yellow spots, and the hind wings orange with black tips. The waxy secretion of another Chinese species (*Plata limbata*) of this family is known in commerce as "Chinese white wax."

LANTERN-SHELL (Anatina) is a genus of molluscs of the order LAMELLIBRANCHIATA, forming the type of a family Anatinidæ.

The Anatinidæ have usually a thin, brittle, oblong, often inequivalve shell, gaping at the hinder extremity, with a nacreous interior, and generally a granular or spinulose exterior. The hinge is obscurely toothed, the cardinal teeth being rudimentary; the ligament is external, thin, and the cartilage is internal, placed in a pit in each valve, and furnished with a peculiar shelly hinge-piece or ossicle, which is placed before it, or sometimes so as to cover the

whole of its surface. The siphons are long and more or less united, the margins of the mantle are united, and the gills are single on each side. This family includes several genera with many fossil species.

The typical lantern-shells (*Anatina*) have a ventricose, thin, and translucent shell, of an oblong form, gaping and attenuated at the hinder extremity. The beaks, which are directed backwards, are fissured or slit externally, and are supported internally by an oblique plate. The cartilage pit in this genus is placed on a projecting spoon-shaped process, which is furnished in front with a transverse linear ossicle. The external surface of the valves is hispid or roughened with calcareous points. The gills are thick and deeply plaited. The opening for the foot is narrow, and the foot is very small and compressed. Numerous species have been described from India, Philippines, New Zealand, and West America. The fossil species are numerous.

Other genera of the family *Anatinide* are *Thracia*, *Pholadomya* (with 160 fossil species, and only one recent), *Lyonsia*, *Pandora*, &c.

LANTERNS, FEAST OF. This picturesque festival in China is said to be due to a tradition that a princess fell into the water and would have been drowned had not her father and his friends run forward with lanterns and so happily discovered her. In commemoration of the event the dignitary instituted this annual festival, whose attractiveness soon insured its popularity.

LAN'THANUM, a metal found in lanthanite, associated with didymium and cerium. It is obtained by decomposing the chloride with sodium. It is a dark gray soft powder. The atomic weight is 46.4; symbol, La. It forms two oxides, protoxide (LaO) and peroxide (LaO₂). It is a rare metal, of no commercial value. It is best separated from its solutions by oxalate of ammonia, which throws it down as oxalate, and this on ignition yields the protoxide.

LAOCOON (*Gr. Laokoon*), according to ancient fable, was the son of Antenor, and a priest of Apollo during the Trojan War. While offering, in the exercise of his office, a bullock to render Neptune propitious to the Trojans, two enormous serpents issued from the sea, and having first destroyed his two sons, whom he vainly endeavored to save, attacked Laocoon himself, and, winding themselves round his body, crushed him to death in their folds. This dreadful punishment was inflicted by the goddess Minerva for the part Laocoon had taken in endeavouring to dissuade the Trojans from dragging into Troy the fatal wooden horse, which the Greeks had consecrated to Minerva, and within whose vast interior a chosen few of their warriors were concealed, who would descend by night and open the gates of the doomed city to their comrades.

An enduring celebrity has been gained for this story from its forming the subject of one of the most remarkable groups in sculpture which time has spared to us. It represents the agonized father and his youthful sons, one on each side of him, writhing and expiring in the complicated folds of the serpents. The figures are naked, the drapery that is introduced being only used to support and fill up the composition. This superb work of art originally decorated the Baths of Titus, among the ruins of which it was found in the year 1506. The names of the sculptors who executed it are also recorded. They are Agasandros, Polydóros, and Athenodóros, natives of Rhodes. A sketch of the Laocoon is given in the Plates of the article SCULPTURE.

With respect to the date of the work, Lessing, whose work on the Laocoon deserves the attention of all who take an interest in the philosophy and capabilities of art, believes the sculptors lived in the reign of Titus. If so the purity of design is most remarkable for so late a work.

This group is justly considered, by all competent judges, to be a masterpiece of art. Intense mental suffering is portrayed in the countenances, while the physical strength of all the three figures is evidently sinking under the irresistible power of the huge reptiles wreathed around their exhausted limbs. One son, on whose side a serpent has fixed his deadly fangs, seems to be fainting; the other, not yet bitten, tries to disengage one foot from the serpent's embrace. The father, Laocoon himself, is mighty in his suffering; every muscle is in extreme action, and his hands and feet are convulsed with painful energy. Yet there is nothing frightful, disgusting, or contrary to beauty in the countenance. The whole of this figure displays the most intimate knowledge of anatomy and of outward form. The youths are of a smaller proportional standard than the father—a liberty hardly justifiable, but taken probably with the view of heightening the effect of the principal figure. The right arm of the figure of Laocoon is a restoration, but the best critics maintain that it should be bent back behind the head and not held out. In addition to proofs from ancient writers against the present conjectural pose, artists urge that it makes the serpents seem like so much india-rubber, by neglecting the great constrictive force the legend claims for them. The group of Laocoon and his sons is now preserved in the museum of the Vatican at Rome.

LAODAMEIA, one of the heroines of the Greek mythology, whose story Wordsworth has selected for the subject of a charming piece. She was wife of Proteus, one of the Greek heroes against Troy, who, regardless of an oracle which told—

"That the first Greek who touched the Trojan strand
Should die—"

leapt ashore from the ships, and met his death by the hands of Hector. His wife, praying and suffering, was rewarded by a brief visit of the shade of the hero—

"He spoke of love, such love as spirits feel
In worlds where e'er a curse is equitable and pure."

But when Laodameia would have embraced the shade, the colour fled from his cheek and she clasped a lifeless form. Upon her releasing the figure it became transparent, and she conversed with it three hours. When the sun was to depart was given, the faithful wife rejoiced to feel that she too, overcome by emotion, was about to accompany him into the unseen world.

"Swift toward the realms that know no earthly day,
He through the portal takes his secret way,
And on the palace floor a lifeless corpse she lay."

LAODICEA, the name of several ancient cities in Asia Minor, of which the most worthy of notice is Laodicea ad Lycum in Phrygia, which is interesting as being the site of one of the seven primitive Christian churches. It was situated on the Lycus, a tributary of the Meander, 120 miles E.S.E. of Smyrna. The site of this town, once ranking as the second in Phrygia, is now marked only by the deserted ruins of public buildings; and hence the neighbouring hamlet, inhabited only by a few squalid Turks, has received the name of *Esli-Zissar*, old castle. The remains are very extensive; and the whole surface within the walls is strewn with pedestals and fragments, indicating by their size and workmanship the former luxury and magnificence of the city. The largest ruin is that of an oblong amphitheatre, having an area of 1000 square feet. Many of the seats are still in tolerable preservation, and at the west end is a vaulted passage about 140 feet long, and designed for the horses and chariots entering the arena. A Greek inscription on the mouldings states that it was completed in the reign of the Emperor Vespasian (82 A.D.), after having occupied twelve years in building. There are remains also of an odeum, two theatres, and a fabric which Chandler supposed had been a senate-house and exchange. The

soil in and about the city is hard, dry, and porous, bearing many indications of an igneous origin; and Laodicea has at many different times suffered greatly from earthquakes.

Laodicea, so called from the wife of its founder, Antiochus II., was long an inconsiderable place, notwithstanding the beneficence of Hiero, Zeno the philosopher, and his son Polemo. After its sufferings, however, in a siege by Mithridates, the Romans strengthened and enlarged it, so that at length, about the Christian era, it became, next to Apamea Cibotos, the largest city of Phrygia, and vied in importance with the cities on the coast. There can be little doubt that it was visited by St. Paul in the course of his missionary tour through Asia Minor, and perhaps the Christian converts of Laodicea, as well as those of Colosse and Hierapolis, both neighbouring towns, were the results of the apostle's preaching. In the Epistle to the Colossians (iv. 16), mention is made of an epistle to the Laodiceans; and though some critics have maintained that it is identical with that to the Ephesians, the more probable conjecture is that it has not come down to modern times. The persecution which raged in Asia Minor during the latter part of the first century tended somewhat to abate the zeal of the Laodicean Christians, and hence the rebuke in the Revelation. It was the scene of ecclesiastical councils in 363 to settle the canon of scripture, and in 476 to condemn the Eutychians. Of the subsequent history of this city for several centuries little is known. It was generally in a prosperous condition under the Roman emperors, and was flourishing even in 1190, when Frederic Barbarossa visited it on his way to the third Crusade. Soon afterwards, however, it was repeatedly attacked and ravaged by the Turks, and finally came into their hands in the beginning of the fourteenth century, since which it has been a mere ruin, "wretched and miserable, and poor, and naked" (Rev. iii. 14-22). *Laodicea ad Lycum* must not be confounded with *Laodicea ad Mariam*. See LAMAKIA.

LAOMEDON, the father of Priam, in the Greek heroic legends, was the founder of Troy. The gods Poseidon and Apollo were punished for refractory conduct against Zeus, by being sent to Laomedon as servants; and Laomedon set them to work to build a great city for him. The gods stipulated for a reward, and when this was refused allowed the sea to invade the land. Poseidon demanded a yearly sacrifice of a virgin, before he would command the flood to retire. Herakles undertook for a reward (certain divine horses) to get this sacrifice annulled; and when he too was tricked he invaded Troy with six ships, took it, and killed Laomedon and all his sons save only Priam, whom he left as king on his departure homewards after his vengeance. Priam, as an aged monarch, ruled Troy during the famous siege told by Homer.

LAON, a town of France, capital of the department of Aisne, situated at a distance of 87 miles north-east of Paris, with a population of 9849. The town is built on a hill in the centre of a large fertile plain; the streets are narrow but well built. The old walls and towers intermixed with the rocks of the hill have a very picturesque effect. The most remarkable building is the cathedral, which is in the Gothic style, of vast size, and surmounted by four lofty towers. There is a tribunal of first instance, a college, a school of design, a public library containing 30,000 volumes, extensive barracks, and a remarkable leaning tower. St. Martin's Church is as old as the twelfth century, and has two good towers. The abbey of St. Martin is now the Hotel Dieu. The chief business of Laon is in agricultural produce. The town surrendered to the Germans on 9th September, 1870; and as the last man of the Garde Mobile left the camp a French soldier, in contravention of the capitulation, blew up the magazine, causing the loss of many lives.

Laon has been sometimes supposed, but on no good grounds, to occupy the site of the *Bibraz* mentioned by

Cæsar. In the middle ages it was distinguished by its industry and wealth; its bishopric was one of the most lucrative in the kingdom; and the position and importance of the town made it be regarded as a kind of second capital. It was, however, far more distinguished by the spirit which animated its inhabitants, and by their persevering efforts to emancipate themselves from the feudal tyranny of their bishops, and to establish a municipal government, and the regular administration of justice under magistrates of their own selection. They succeeded in establishing an independent government so early as the year 1110; and maintained it, at the cost of many great sacrifices, for above two centuries, or till 1331, when it was finally abolished by royal ordinance. Here, on the 9th and 10th March, 1814, a battle was fought between Blücher and Napoleon, ending in the retreat of the latter. Lothaire I., St. Remi, and Marshal Serrurier were born in Laon; a statue has been erected to the last near the Hotel de Ville.

LAO-TZE, a celebrated Chinese teacher, and the reputed founder of one of its systems of religion, known as Taoism. The name Lao-Tze represents his title to eminence, and may be interpreted as originally meaning "Venerable sage." Very little is known as to his life, and most of the stories cherished by the Taoists are purely legendary. According to one of these he was the offspring of a supernatural conception, and was carried in his mother's womb for sixty, seventy, or eighty years (authorities are not agreed as to the exact number) before he was born. Sundry other stories almost equally marvellous are preserved, but there are also many incidents which have all the appearance of truth. From these we gather that he was born in a hamlet near the present city of Kwei-teh, in the province of Honan, somewhere about the year 604 B.C. His family name was Li (plum), and his youthful name Urh (ear). He obtained the position of historiographer at the court of Ch'ien, and was intrusted with the charge of the royal library. This position would afford him ample opportunities for study, and he seems to have turned them to such good account as to gain for himself a high reputation as a philosopher. In the year 517 B.C., Confucius (Kung-fu-tze) was so attracted by his fame that he paid him a visit, and an interesting account of the conversation of these two great men has been preserved. Lao seems to have treated Confucius rather disrespectfully, but the latter came away with a high opinion of his wisdom, and lauded him before his own disciples. Lao after residing at the court of Ch'ien until he reached old age, found the disorders incident on the decay of the reigning dynasty become intolerable, and he accordingly resolved to withdraw into complete retirement. Mounting a black ox he was riding into the pass of Han-kä towards Tibet, when the officer in charge of the gate stopped him and begged him as he was leaving them to write a book for their instruction. Lao complied and stayed until he had written the famous "Tao Teh King," after which he resumed his journey, and history is silent as to what became of him. The historian Ch'ien, who records his life, remarks that "he was a superior man, who liked to keep in obscurity."

The "Tao Teh King," which has been preserved, is a short treatise, containing only between 5000 and 6000 words, but its interpretation has proved to be a task of much difficulty both to Chinese and European scholars. The aim of the book is to set forth the nature of *Tao*, and the manner in which national, social, and personal life should be regulated in accordance with its principles. As to the meaning of the term *Tao* many interpretations have been suggested. Considered in reference to etymology it has been rendered "way," "road," or "path," but it is always admitted that these terms, even when most spiritually understood, are inadequate to express the meaning of *Tao*. By other scholars the terms "nature," "reason,"

"the logos," or, the "word," have been adopted, but the fact is we have no term exactly corresponding to *Tao* in the Western languages. According to some students of this remarkable book, the author denies the existence of a personal deity, and substitutes a vague pantheistic conception for the prevailing belief, but others find in it an express recognition of the existence of God as a ruler and governor. The obscurity of the philosophical portions of the book is, however, universally admitted, and possibly a clear understanding of the thought embodied is yet to be attained. Its practical teaching is, however, more comprehensible, and it contains much that is beautiful and instructive. The virtues of humility, gentleness, moderation, and meekness are strongly advocated, and there are some passages which bear a great resemblance to some of the watchwords of Christianity. For the convenience of students and readers the book is usually divided into eighty-two short sections or chapters, and in section 63 we find the following:—"It is the way of Tao not to act from any personal motive, to conduct affairs without feeling the trouble of them, to taste without being aware of the flavour, to account the great as small and the small as great, to recompense injury with kindness." There is not the slightest reason to suppose that the New Testament owes anything to the Tao Teh King, but the similarity existing between some of its precepts and the passage quoted is too evident to need pointing out in detail. In reference to public life and government, Lao-Tze seems to advocate a return to an imaginary primitive simplicity, and his ideas on these subjects are not such as commend themselves to Western minds.

With respect to the religious system known as Taoism there is no evidence of its having been established until several centuries after the death of Lao-Tze. For a long period he seems to have been regarded merely as a philosopher and teacher, but ultimately his name became identified with a system of religion curiously out of keeping with his teaching and the known features of his character. In the external practices of its devotees much was imitated from Buddhism, but polytheism, divination, the invocation of spirits, the search after the elixir of life, with a multitude of other superstitions, became incorporated with it. The chief instrument in bringing about this change appears to have been Chang-Tao-ling, who lived in the first century of our era. It is believed by the Taoists that his spirit has ever since continued to become incarnate in his descendants, and they honour one of them as the spiritual head of their system to this day. In the second and third centuries of our era the sect gained a multitude of adherents, and it is said that several of the emperors practised the rites of Taoism and drank with fatal results the so-called elixir of life. At the present day the system has an immense number of followers in China, Cochin-China, Japan, Tonquin, and among the Indo-Chinese nations; but it is despised by the educated Chinese, and it finds nearly all its followers among the ignorant and the poor. Dr. Legge describes it as a conglomeration of base and dangerous superstitions, but says also that Lao-Tze ought not to bear the obloquy of being its founder.

LAPIDARY WORK. The work of the lapidary is that of cutting, shaping, grinding, and polishing small hard pieces of stone, especially those which go by the name of gems or precious stones. Such stones require different modes of treatment, according to their hardness. The diamond, sapphire, ruby, chrysoberyl, and zircon rank among the very hardest; the agate, amethyst, bloodstone, cornelian, caruncle, cat's-eye, crystal, emerald, feldspar, granite, jasper, lapis-lazuli, onyx, opal, sardonyx, serpentine, and topaz, though differing much among themselves in hardness, may be considered as occupying a sort of medium rank; while a softer class is that which includes alabaster, coral, glass, jet, lava, malachite, mother-of-pearl,

steatite, &c. It is by means of small revolving wheels that these are cut and polished by the lapidary. The wheels are of iron, lead, wood, and other substances. For cutting, the edge of the wheel is sharp, and is touched with moistened diamond-powder or emery-powder, and then acts like an exquisitely fine saw, which works its way through the hardest gems when applied to it. The grinding is performed on a horizontal lead wheel, charged on its upper surface with emery-powder, the stone to be ground being pressed against it with the hand until it is smooth enough for polishing. In polishing, a tin wheel, or sometimes a wooden one, covered with leather, is used, the polishing material being rotten-stone.

One of the most delicate examples of lapidary work ever executed was the shaping of the world-renowned *Kontisnoor*; a small steam-engine and a revolving apparatus were made expressly for the purpose, and the great Duke of Wellington cut the first facet, as an amateur who took great interest in the matter, a few months before his death in 1852. Elaborate as the arrangements were, the lapidary work was essentially the same in this as in other instances—the friction of a rapidly-revolving metal wheel moistened with diamond-powder and oil.

LAPIS-LAZULI is a mineral of a beautiful blue (ultramarine) colour. It is frequently polished and used for some kinds of jewelry; more usually it is cut into vases and other ornamental works. It was a favourite stone among the Egyptians, who cut it into amulets and used it for similar purposes.

Lapis-lazuli is essentially a silicate of alumina, fine, and soda, but sulphides of iron and soda are also present in small quantities. The colour is supposed to be due to the sodium sulphide. It occurs mostly massive, but sometimes in isometric dodecahedrons. It has a hardness of 5 and specific gravity of 2.4. Persia, China, Tibet, Tartary, Siberia, and Transylvania have furnished specimens of this mineral, which occurs in syenite and granular limestone.

In its powdered form it was highly prized for ultramarine paint, but this has been superseded by the artificial substitute formed by heating together clay, carbonate of soda, and sulphur.

LAP'ITHAI (Latin *Lapithæ*), in the Greek mythology, descendants of Lapitès, the brother of Kentauri, from which latter the Kentauri or Centaurs, that is, the "Bain-killers," descended. These Kentauri ought properly to be distinguished from then kindred the Hippo-Kentauri, who had the form of a horse, with a man's head and body rising from the chest. The two kinds became amalgamated in the later poets. Peirithoos governed the Lapithi in Thessaly. The Centaurs demanded to share the kingdom with their kinsmen, and as the latter refused the famous war of the Centaurs and Lapithæ arose. At last a peace was agreed to; but at the marriage feast of Peirithoos with Hippodamia the old hatred broke out again, stirred by the fumes of wine, and the Centaurs attempted to seize the bride and the other women and carry them off, but in this they were defeated and were indeed almost exterminated in the struggle. No doubt the fact underlying this legend is that of a displacement of one Thessalian tribe by another, but at present no further clue has been obtained.

LAPLACE, PIERRE SIMON, one of the greatest of mathematical theorists, was born in Mureh, 1749, at Beaumont-en-Auge, near Hontleur, and was the son of a poor farmer. He received a good education, by the charity of some kind neighbours, and appears at first to have turned his attention to theology; but as early as the age of eighteen he went to Paris, having previously taught mathematics at his native place. He had letters of introduction to D'Alembert; but finding that they produced him no notice from that philosopher, he wrote him a letter on some elementary points of mechanics, with which D'Alembert was so much pleased that he sent for Laplace the same day,

telling him that he had found a better way of calling attention to his claims than by letters of introduction. Very shortly afterwards the recommendation of D'Alembert procured for Laplace a chair of mathematics at the military school of Paris. This took place in 1768 or 1769. In 1772 Laplace showed his powers in a paper on integration of equations of finite differences in the "Mémoires" of the Academy of Turin; and from that time his scientific life showed one achievement after another, until he attained a reputation almost Newtonian with the world at large, and of the highest extent and character among mathematicians. In fact the sceptre of mathematics, and hence of astronomy itself, hitherto entirely in the hands of Newton and his compatriots, passed now as absolutely away from England until the Herschels once more restored to us the lead. The reason lay in the dogged English refusal to use the methods of the new analysis, which Clairaut, D'Alembert, and Euler, and after them Lagrange and Laplace, wielded as a weapon of unmatched force.

The political life of Laplace was not so favourably distinguished. In 1796 Laplace was one of a deputation who waited on the Council of 500 to declare their eternal hatred to royalty. In 1799 the First Consul made him minister of the interior. With the views which Napoleon always professed with respect to science, it is not wonderful that he should have made the experiment of trying to strengthen his administration by the assistance of a philosopher whose rising fame made the French exact to claim a name which should rival that of Newton. But the experiment was not successful; and after a very short period the First Consul removed Laplace, considering him with the exception of the Senate. The subsequent account given by Napoleon of his minister will be found in the biography of Laplace in all the editions of "A mathématicien de la plus haute école, le plus grand homme de son siècle, et le plus grand homme de son siècle." In his very first attempt at business to consider as well as they had made and made. Laplace looked at no question in his true point of view. He was always seeking after subtleties, all his ideas were problems, and he carried the spirit of the infinitesimal calculus into the management of business.

In 1814 Laplace voted for the deposition of Napoleon—a step which might have been justified on public grounds; but nothing can excuse the suppression of the fulsome dedication to Napoleon ("Héros, protecteur," &c.) which stood at the front of his "Théorie des Probabilités" during the prosperity of his great patron. Laplace, who had been created a count by Napoleon, was made a marquis by Louis XVIII. immediately after the Restoration. He did not appear at Napoleon's court during the Hundred Days. After the second Restoration (1815), Laplace's only public employments were of a scientific character, and he died on the 6th of May, 1827. His last words were dignified:—"Ce que nous considérons est peut-être chose que nous ignorons est immense." One would wish to remember him by these words, in the spirit of Newton's "pobles on the sphere," and to forget the trifles and shabbiness of his conduct in life. As a man, Laplace wins our sympathy as a mathematician, our admiration.

The author of the "Mécanique Céleste," to use a common expression for Laplace, must indeed be an object of the admiration of posterity as long as any record of the eighteenth century exists. With the exception of some experiments made in conjunction with Lavoisier, to determine the quantity of heat in different bodies, we do not find that Laplace was greatly employed in actual experiment. But for many years he was the head, though not the hand, of European astronomy; and most of the labours of observation were made in directions pointed out by him, or for the furtherance of his discoveries in the consequences of the law of gravitation.

In 1784 the supremacy of Laplace in astronomy was

established at one blow by probably the most remarkable memoir ever presented to a scientific society. Laplace herein demonstrated to the Paris Academy, by vigorous mathematical proof, that the solar system was stable, its motions all necessary and accounted for; and even solved the long-existing mysteries of the long inequality of Jupiter and Saturn, and of the periods of Jupiter's satellites. The irregularities of Jupiter and Saturn, which had been the great stumbling-block to the full acceptance of the theory of gravitation, because they seemed to contradict it, were resolved by Laplace into a period of 929 years; and he showed how the mean motions of the planets would be alternately accelerated and retarded during that period, in a series which, after the 929 years, would exactly repeat itself; and further, how the last change from acceleration to retardation occurred in 1560, thereby accounting for the startling discrepancy of modern from ancient observations. In this way an objection became one of the most striking and beautiful proofs possible. The stability of the solar system resulted from two theories accurately proved to demonstration in this memoir. The first reconciles the oscillations in the shape of the orbits of the planets by this splendid generalization:—"If the mass of the planet be multiplied by the square of the eccentricity, and this product by the square root of the mean distance, the sum of these quantities will always retain the same magnitude." The second shows that the plane in which the planet moves—that is, the plane of its orbit—must remain practically stationary in space. It runs thus:—"If the mass of the planet be multiplied by the square of the tangent of the orbit's inclination to a particular fixed plane, and this product by the square root of the mean distance, the sum of such quantities will continue invariable." It was at once evident that here was another Kepler, one of those theorists who are endowed with a luminous penetration which sees the relations between multiplex phenomena hidden to all eyes but theirs. But a far more wonderful result of the brilliant imagination of the philosopher was now to come in the "Mécanique Céleste."

The first two volumes of the "Mécanique Céleste" appeared in 1799, and may have been the inducement of the First Consul to make Laplace a member of the government. The third volume appeared in 1802, the fourth in 1805, and the fifth in 1825. One posthumous supplement has appeared. Its bulk is about 2000 quarto pages. If all this work had been collected by one man, even from the writings of others, we should have prized his writings for their extent, their faithful representation of the state of the science at a particular time, and the diligence displayed in the undertaking. When we add that to Laplace is due the discovery of much, the development of more, and that by the employment of his own resources in a manner which takes all the originality and power of the investigator, and the arrangement and combination of the whole, we are lost in astonishment. Laplace's theory as to the formation of the solar system has been adopted by most eminent and living astronomers, and in its present development, the NEBULAR HYPOTHESIS, is one of the most magnificent hypotheses ever devised. Its account is elsewhere given. Many have worked towards it, but the germ of the whole wondrous structure lay in the pregnant thought of Laplace. It was he who first proved the gradual diminution of the velocity of the moon, and the ever-widening circle of her orbit round the earth—foundation of George Darwin's brilliant discoveries in these later years; it was he who proved the non-solidity of Saturn's ring, who completed the theory of the velocity of sound left imperfect by Newton, who discovered the balance of tidal oscillations. Wherever his glance turned it saw order in complexity, and all his suggestions have not even yet been exhausted.

Laplace explained his discoveries in a shorter work entitled "L'Exposition du Système du Monde," of which the

fifth edition bears the date 1824. The account here given is in a style and clearness of a superior kind, but somewhat too egotistical, and partaking of the disposition to suppress all notice of predecessors common to so many French mathematical writers. A similar companion to the "Theory of Probabilities" was published (fifth edition, 1825) under the title of "Essai Philosophique sur les Probabilités." A little treatise, published in 1821, called "Précis de l'Histoire de l'Astronomie," afterwards was made the fifth book of the fifth edition of the "Système du Monde." His lectures are in "Leçons de l'Ecole Normale." Of the "Théorie des Probabilités" one can speak precisely as of the "Mécanique Céleste," adding perhaps that there is no part of the latter in which more original power is displayed than in the former. The subject being somewhat isolated, its results are little known; they have, however, been extensively applied to astronomy.

LAPLAND, the country of the Lapps, comprehends the northern and north-eastern part of the Scandinavian peninsula, from 64° to 71° N. lat., and from the White Sea to the Atlantic.

The term Lapland is, however, a mere geographical expression suggested by its inhabitants, as this stretch of land is divided into several provinces with various names. The expression probably comprises an area of about 150,000 square miles, of which about two-thirds are subject to Russia and the other third to Sweden and Norway. Russian Lapland is separated from Swedish Lapland by the river Muonio and the Tornea Elf, and from Norwegian Lapland by the Tana Elf. Russian Lapland is divided between the two governments of Archangel and Ulenborg; in the former it constitutes the district of Kola, and in the second that of Tornea. Swedish Lapland is divided between the two districts (*læns*) of Umea and Umea. Norwegian Lapland is called Finnmarken. The Norwegians do thus by some strange misconception apply the term "Finn" to the Lapp, which is, however, erroneous, as the Finns are the inhabitants of Russian Finland, and belong to the Teutonic race. As the country extends over half a dozen degrees of latitude, it is naturally varied in character, and although in general wild and forbidding, can boast of some of the finest contrasts of scenery in the world. Thus in Norway the country assumes the impressive character of a high Alpine landscape. Here the continuation of the Norwegian range of the Kjølen Mountains, rising in some places to a height of 6000 feet, covered with snow the greater part of the year, alternate with smiling valleys and fertile fields. In Sweden it is distinguished by enormous primeval forests of fir and spruce, while in Russia it culminates in low mountain ranges, some covered with permanent snow and ice, or in deserted and flowerless moorland wastes. The flora of the country varies exceedingly between the coast of Norway and the shores of the Murman province; but the fauna is in general the same, and the bear, the wolf, and the fox may be met with equally throughout Lapland, while the whale, the walrus, and the seal haunt the seas from the North Cape to the Kanin Noss. But everywhere the country is rich in lakes and running waters, which in summer produce millions of mosquitoes, in ferocity and venom fully the match of their southern kindred.

The climate is very cold. Three-fourths of the year the country is covered with snow, and the frost between November and March is very intense. A few days of intensely hot weather occur in July and August.

Four nations inhabit Lapland—the Lapps, Swedes and Norwegians, Finns, and Russians. The original inhabitants, the Lapps, are mostly located in the sterile districts northward of the polar circle. They are divided into the fisher Lapps of the sea-coast and the nomad Lapps of the interior. The former are dispersed among the lakes and along the banks of the rivers, where they live on the pro-

duce of their fisheries. The Swedes and Norwegians occupy those tracts which are adapted to agriculture, where they cultivate rye, barley, oats, and potatoes. Bailey grows as far north as 70° lat. But the best pasture grounds and meadows are in possession of the Finns. The Russians live in the district of Kola, where they are chiefly occupied as fishermen or as merchants.

Wild animals are numerous, including bears, beavers, wild reindeer, wolves, lynxes, wolverines, foxes, hares, squirrels, martens, otters, and lemmings. Among the birds are eagles, capercaillies, woodcocks, and a variety of sea-birds. The forests, which cover a considerable part of the surface of the country, consist mostly of birch, fir, pine, alder, and aspen.

The Bible has been translated into different dialects of the Lapp language. The country contains only a few scattered villages, the principal in the Russian portion being Enontekiis, Enare, and Kola.

This interesting race is, however, fast disappearing, both on account of the well-known tendency which the white



A Lapp Lady.

man has to drive his coloured brother to the wall through drink, and by the stern fact that an advanced civilization does not permit the existence of a free roaming tribe in its immediate vicinity. At present there are only 10,000 Nenets Lapps in Europe, of which Norway claims about 1500 and Sweden and Russia the rest. The exact number is, however, exceedingly difficult to fix, as a great number of so-called Russian Lapps wander at times to the shores of Norway, and at others to the Baltic; while sometimes the Scandinavian Lapp may be found within the dominions of the czar, according to the supply of moss and the wanderings of the reindeer.

The Lapps are physically an ill-developed, diminutive race, with small eyes, low forehead, high cheek-bones, pointed chin, and scanty beard. Men and women dress nearly alike; and in both the straight black hair flows

lankily down the back and sides of the head; while the men having little or no beard or whisker, it is hard to distinguish one sex from the other. The Lapps in Norway, who now obtain their living by fishing and shooting or agriculture, are called *So*, Sea Lapps, or *Bo*, Settled Lapps, and number about 16,000. They were once Nomads or Mountain (*Fjeld*) Lapps, whom circumstances have compelled to renounce the free and invigorating roaming life on the wastes of Lapland. They are now in appearance and habits very different to the Nomadic Lapp, who still follows the avocation of a reindeer herdsman. The reindeer is always caught with a lasso, which a Lapp handles with great skill, and the herds are guarded when grazing by a small trusty dog, a kind of Pomeranian. These are the only two domestic animals which the Lapp cherishes. Many of them are very good marksmen, and regularly supply the large annual markets of Vitangi and Kengis with game and skins, which are sent by Tornea to Stockholm, where they meet with a ready sale. Each man has his house and patch of arable land, a cow or two and a horse, with grass for hay from the river or lake side. Some have a few reindeer, some have none, others have 300 or 400, which during the cooler part of summer and in the autumn wander about on the hills. Everybody smokes except when eating or sleeping. The Nomadic Lapps wander from place to place in search of pasture for their reindeer, and during these wanderings their sufferings are often very severe. For nearly one-fourth of the year the sun is below the horizon in Lapland, and winter lasts for almost double that time. But in spite of all this, and of extreme cold, and, still more, extreme dirt, the Laplander is contented. Uleå is the most important town in the upper part of the Gulf of Bothnia; it can boast of a large town-hall, governor's residence, and church; but is uncivilized enough to possess neither prison, policeman, magistrate, nor soldier. Theft is unknown, and on leaving home the inhabitant hangs the door-key on a peg outside to show that he is not at home. Sicknes is almost unknown to the Lapp, and when he takes to his bed it is usually the bed of death. Their dwellings are either circularly shaped mud huts, raised on stakes, and almost impervious to light and air, or hide-covered tents. Their peculiar customs and physical stature keep them completely isolated from the finely-made Norwegian and Swedish peasants.

When the primitive Lapp first invaded the regions which he now inhabits is still a matter of controversy among men of science, as is also the question of whence he came and what was his origin. The language is a Finnish dialect; but it contains so many obsolete and foreign words that they are not intelligible by the inhabitants of Finland, nor indeed can the tribes in one part understand the language spoken by those of another. The Lapone has been mixed more than the other Finnish tongues with the German and Scandinavian, and hence its principal roots and derivations bear much less affinity with those in the languages of Upper Asia. (See "The White Sea Peninsula," by Edward Læ. London, 1882.)

LAP-SANA, a genus of plants belonging to the order *COMPOSITE*. There is only one British species of this genus, the *Lapsana communis* (Nipplewort). It is found in waste uncultivated land, and derives its common name from its reputation in village medicine, as a soothing application to inflamed nipples. *Lapsana felida* is a species of this genus which grows in Switzerland and on the Alps. There are eight to twelve florets in each head, all perfect and ligulate, there is no pappus, the receptacle is without scales, and the involucre-bracts are in one row with a few short bracts at their base.

LAP-WING (*Vanellus cristatus*) is one of the best known and most abundant of the *Plover* family (*Charadriidae*) in this country. It breeds in all the temperate

countries of Europe and Asia. Towards winter the majority migrate to the warmer south, going to Egypt and India; but some are to be found in England throughout the year, collecting in autumn and winter in flocks near the sea-shore. This bird frequents marshy ground near the borders of lakes and rivers, and is also found on open heaths, commons, and moors. It deposits its eggs, usually four in number, in a slight depression in the ground. The eggs, which are olive with black spots, are in great esteem for the table, being known as "plover's eggs." Large numbers of lapwings are shot for the London markets, where they are known as "golden plovers;" they are protected during the breeding season by the Wild Birds Preservation Act passed in 1873. When disturbed on their eggs the parent birds evince great distress, and make use of various stratagems to lure the intruder away from the nest. The food of the lapwing consists of worms, slugs, and insects; and no bird deserves the farmer's friendship more thoroughly. The lapwings have large rounded wings, and their powers of flight are considerable; they also run nimbly on the ground. They are called in some parts *Ploverits*, in imitation of their note.

The lapwing is rather more than 12 inches in length. Its head is adorned with a pointed crest, consisting of six or eight narrow elongated feathers with their tips curled upwards; the crest is usually carried in a horizontal position, but can be elevated or depressed at pleasure. The upper surface of the plumage is dark green with a purple and coppery lustre; the lower surface is white; the crown of the head, the face, throat, and upper part of the breast are black; the sides and back of the neck are white, speckled with black; the tail-coverts are bright bay.

LAR, LAR'ES (or *Lares*), Roman household gods. Every family had its own household gods, its *Lar* and its *Penates*, kept in a special apartment, the *Lararium*, in the form of small images of youths, clad in a short tunic girt at the waist, holding a horn of plenty in one hand and a flat sacrifice-dish in the other. When a youth left the father's house he prayed, "Penates of my fathers! and you *Lar*, father of our family! I commend to you my parents. Other *Penates* and another *Lar* must I now seek." The worship of the family *Lar* consisted in prayers said by pious folk every day, in oblations offered at every meal, and in wreathings and decorations at all family festivals. Even those who omitted daily prayers never neglected the three great monthly festivals, the calends, nones, and ides.

The *Lar* was the spirit of the deceased progenitor; and towns therefore had their public *Lares*. There were two in Rome in each street, their festival was the *Compitalia*, and their altars were continually decked and held in honour. After the murder of the great Caesar his image was added as a third among the public *Lares* and worshipped with the rest.

LAR BOARD, the left side of a vessel as one faces the bows; now more usually called *port*, as the names *larboard* and *starboard* (the right side) are so much alike as to cause confusion. The derivation is from the Italian term *quello bordo* (that side), just as *starboard* comes from *questo bordo* (this side), the first syllable being omitted in each case.

LAR'CENY (Lat. *latrocinium*; Fr. *larcin*) is the legal term for theft, and as an offence is committed by wrongfully taking, against the will of the owner, and carrying away the goods of another, with the fraudulent and felonious intent wholly to deprive him of his property therein.

The crime was formerly divided into grand and petty larceny, distinguished by the value of the property taken at one and the same time. It was grand larceny where the value was more than 12*d.*; petty larceny where the value did not exceed that amount—a distinction referable to times in which 12*d.* was more than equivalent to as many shillings of the present currency. At common law the

punishment of petty larceny was whipping or imprisonment, that of grand larceny was death; but in practice several methods were introduced by which the latter penalty could be mitigated. By 4 Geo. I. c. 11, grand and petty larceny were made punishable by transportation, and by 7 & 8 Geo. IV. c. 28 the distinction between grand and petty larceny was abolished. The statute law relating to larceny was consolidated by the 24 & 25 Viet. c. 96, whereby every larceny is to be deemed of the same nature, and persons convicted of simple larceny are made liable at the discretion of the court to be kept in penal servitude for three years, or to be imprisoned for a term not exceeding two years, and, if males under sixteen, to public whipping in addition to imprisonment—such whipping to be administered by a birch rod and not to exceed twelve strokes. The court is also empowered to sentence the offenders to be imprisoned and kept to hard labour, and also to direct that they shall be kept in solitary confinement as to the court in its discretion shall seem meet.

In larceny the wrongful taking may be either actual or constructive. It is actual taking against the will of the owner when goods are either taken directly out of the possession of the owner, or out of the keeping of another person who holds them for the owner. Constructive taking against the will of the owner is either where the possession of goods is obtained from the owner with an intent to steal them, in which case the original taking is felonious; or where the owner, without parting with the legal possession, delivers goods into the hands of a person who afterwards converts them to his own use, or to some other purpose inconsistent with the continuance of the owner's property in them, in which case such conversion constitutes the felonious taking. There must not only be a taking, but also a carrying away, technically called asportation, to constitute which the goods stolen must be actually removed from the position which they occupied. Entire removal, to however slight a distance, is a sufficient asportation. Of things which adhere to the soil and freehold, such as corn, grass, trees, and the like, no larceny can be committed at common law, but the severance of them is a trespass, and is the subject of a civil action. But if the owner or a stranger sever them, or if the thief himself do so, and at another time carry them away, it is felony. The conversion of found goods by the finder to his own use does not amount to larceny, unless at the time of the conversion he knows, or has the means of knowing, who is the real owner. But it is held to be larceny to convert to private use lost property left in cabs, railway carriages, &c.

Where larceny is attended by circumstances which constitute an aggravation of the offence, punishments of a heavier character may be awarded. Larceny from the person of another, whether openly or clandestinely, is a felony punishable by penal servitude for fourteen or not less than three years, or imprisonment for not more than two years with or without hard labour. Robbery from the person with violence or intent to assault is punishable with penal servitude for life or not less than three years, or imprisonment for two years with or without hard labour. Breaking and entering a dwelling-house and stealing therein any chattel, money, or valuable security to any value whatever is punishable with penal servitude for life or for not less than three years, or imprisonment not exceeding two years with or without hard labour and solitary confinement. Stealing in a dwelling-house any chattel, money, or valuable security to the value of £5, without a breaking and entering, is a felony punishable by penal servitude for not more than fourteen or less than three years, or imprisonment not exceeding two years with or without hard labour. The same punishment is awarded to larcenies in ships, wharfs, &c. Larceny of letters by post-office letter-carriers or servants is punishable with seven years' penal servitude, but if the letters contain money the punishment may ex-

tend to penal servitude for life. The term larceny is not used in Scotch law, and in the punishment of theft very much is left to the discretion of the court.

LARCH. See LARIX.

LARD is the melted fat of the common hog. As an article of commerce it is in very extensive use, and it has been calculated that the annual produce in the United States of America alone amounts to over 5,000,000 cwts. The finest quality of lard is that prepared from the "leaf" fat of the abdominal cavity, but fatty scraps of all kinds are also utilized in the manufacture. The best qualities of lard are largely used for culinary purposes, and in medicine as the basis of ointments, plaisters, and suppositories. The inferior kinds are used in the dressing of leather and for the making of lard-oil and stearine. Lard oil is a very valuable lubricant for machinery, and it is also largely used to adulterate oils of higher commercial value. Large quantities of lard are manufactured in Great Britain, that made in Wiltshire having an especial reputation for culinary purposes. The amount imported from abroad is also very considerable, and sometimes reaches a value of nearly £2,000,000 in a year, nearly the whole coming from the United States of America.

LARDA'CEIN, or the so-called *amyloid substance* (an incorrect description), is found as a deposit in the spleen, liver, kidney, lungs, and bloodvessels of man. It is soluble in dilute ammonia but insoluble in water, dilute acids and alkalis, and neutral saline solutions. It resembles closely the other proteids in its formula, which is $O_{10} \text{ (and S.) } 21 \cdot 1$; H_7 ; $N_1 \cdot 5$; $C_53 \cdot 6$. The sulphur is in the oxidized state, and no amount of boiling with caustic potash gives a sulphide of the alkali. We may therefore rank lardacein as a proteid. Strong hydrochloric acid and caustic alkali convert it into acid-albumin and alkali albumin respectively. On the other hand, unlike other proteids, it turns red (not yellow) under iodine, and violet if to the iodine sulphuric acid be added. From these reactions the name "amyloid" arose rather absurdly, for it cannot be assimilated to starch in composition, nor can it be converted to sugar by any means.

LARDIZA BALA, a genus of plants belonging to the order MENISPERMACEÆ, and named after Miguel Lardizala, a Spanish naturalist. *Lardizaba latifolia* is a twining shrub, a native of Chili in woods at Concepcion, also in Peru about Areuco. It has an edible fruit, which is gathered and sold in the markets of Chili and Peru. The pulp of the fruit is sweet and grateful to the taste. The fibre is used for making cordage. It is a hardy plant, and has been introduced into England. It is adapted for training against a wall, and its dark green glossy leaves and hanging bunches of deep purple flowers recommend it as an ornamental plant.

LARD'NER, DR. DIONYSIUS, an industrious scientific writer, was born in Dublin on the 3rd of April, 1793, and died 29th April, 1859. He was educated at Trinity College, Dublin, of which, from 1817 to 1827, he was fellow and tutor; from 1828 to 1840 he was professor of natural philosophy in University College, London. In 1830 he projected a series of manuals of mathematical, mechanical, and physical science, and 134 volumes were published, under the general name of "Lardner's Cyclopædia," between 1830 and 1841, and a second edition in 1853 and following years. Many of the volumes were from his own pen, and these, together with his handbooks of natural philosophy, and a popular exposition of the physical sciences, entitled "Museum of Science and Art," are remarkable for their clear style and lucid arrangement.

LARDNER, NATHANIEL, D.D., born 1684, died 1768, was a Presbyterian minister. He studied at Utrecht under Graevius and Burmann, and afterwards at Leyden. He became private chaplain in the family of Lady Tisbury, who died in 1729, and was a lecturer at the dissenting

chapel in the Old Jewry. His "Credibility of the Gospel History," the "Supplement" to it, and his "Jewish and Heathen Testimonies" have been considered as the most rational defences of Christianity that had been made up to his time. The most remarkable of his minor publications is his "Letter on the Logos," from which it distinctly appears that he was of the Unitarian school. The best editions of his works are those by Dr. Andrew Kippis (eleven vols. 8vo, 1788; in four vols. 4to in 1817; and in ten vols. 8vo in 1827).

LARGE or **MAXIM**, one of the ancient musical notes. The *nota maxima* (or large), as its name implies, was the largest note in music, having the value of two "longs" (*nota longa*), or four "shorts" (*nota brevis*). Curiously enough the *breve*, or "short," is at the present day our longest note of all. The form of the large was an oblong made by two squares, thus showing visibly its value in relation to the long, which was square in form. Both long and large had a tail, always on the right-hand side, and in early copies always descending. When white notes or empty notes (*vacantes*) were used, such as we now write for our semibreve and minim, the oblong outline of the large was still retained, and the tail on the right was as retained.

LAR'GO, LARGHETTO. *Largo* indicates one of the slowest paces in music, and carries with it the greatest solemnity and grandeur. It rather applies, indeed, to character than pace. Perhaps, as a rule, *grace* is slower. In the Messiah "Behold the Lamb of God" and "He was despised" are both *largo*, and well indicate the meaning of the word. *Larghetto* is a quicker time, but preserving the lamented feeling of the *largo*. In actual pace it is nearly as fast as *andante*.

LARGS, a seaport of Scotland, in the county of Ayr, beautifully situated on a bay of the same name, 22 miles N.W. of Glasgow, and 136 miles from London, being 5 miles from the Wemyss Bay station of the Caledonian Railway. It is sheltered by the island of Great Cumbrae, and is a favourite place of resort for sea-bathing. A pier was erected in 1831, and steam boats ply between Glasgow and Largs. The town is chiefly composed of a line of handsome houses, facing the sea, on a narrow strip of land between the sea and the sides of the coast range, which rises steeply behind to a height of 1751 feet. The chief street runs inland from the harbour. There are a parish church, a Free church, a United Presbyterian church, an Episcopal church, and a Roman Catholic church. A part of an ancient church has been converted to a curious museum. It stands near to the present parish church. The population of the parish in 1881 was 5149; of the town, 3079. Largs is celebrated in history as the scene of a great battle, fought in 1263, between Hacon, king of Norway, and the troops of Alexander III., in which the former was signally defeated. The cairns and tumuli, erected by permission of the earl-piers by the Norwegians over their slain, are still visible on the south side of the town.

LARIDÆ is a family of birds belonging to the order ANSERES. This family is divided into two distinct groups or sub-families, Larinæ (Gulls) and Sterninæ (Terns).

LARISSA, the ancient capital of Thessaly, formerly belonging to Turkey, but ceded to Greece in 1881. It is situated 25 miles north-west of Volos on the left bank of the Saliabria, the ancient *Peneus*. It is surrounded by a wall, inside of which are a great number of clay-built houses, forming narrow and dirty streets. It has manufactures of cotton, silks, and morocco leather. Population, 30,000. Modern Larissa is supposed to occupy the site of the ancient city of the same name, which claimed to be the birthplace of Achilles, hence called *Larissean*, and it is probably identical with the *Plargikon Argoa* mentioned by Homer in his catalogue of the Greek forces, (*Iad.* II. 681.) At a subsequent period it acquired

some celebrity from its adoption of the democratical form of government, and from its zealous support of the Athenian cause during the Peloponnesian war. (Compare Aristot. Pol. v. 6, with Thuc. ii. 32.) It afterwards fell into the hands of Philip of Macedon and his successors, under whom it remained until the subversion of their empire by the Romans. It appears to have declined under the early Roman emperors from its ancient importance. Lucan says of it —

"Atque olim Larissa potens" Lib. vi. 355.

The town and neighbourhood were subject in ancient times to the same violent and sudden inundations which now cause such extensive mischief. In the neighbourhood there is a colony of Soudanese, left here by Ali Pasha.

LAR'IX (Larch) is a genus of trees belonging to the *AULIFERÆ*, a tribe of *CONIFERÆ*. The Common Larch (*Larix europæa*) is a native of Central Europe, Russia, and Siberia. It was introduced into the British Isles in 1729, and some of the oldest and finest in this country are the "Dunkeld Larches," about 150 years old, 100 feet high, and containing 480 cubic feet of timber. It is very ornamental, the trunk is erect, the branches drooping, the leaves are of a tender green in the spring, and are arranged in long pendulous tassels. It is well suited for growth on barren exposed situations which are well drained, and in the course of fifty years will reach the height of 80 feet. The timber is of great value for domestic utensils, furniture, farm implements, &c., and even for naval purposes. It is said that houses in Venice constructed of the timber show no signs of decay, and that many old Italian paintings owe their preservation to being painted on panels of larch. The bark is used like that of the oak, for tanning. Venice turpentine is obtained from incisions at the base of the trunk.

There are in all eight species, all natives of the temperate regions of the northern hemisphere. The flowers are monoecious. The male flowers are solitary in scaly buds; the staminal column is roundish with the anthers crowded spirally, and the connective is scarcely produced beyond the anther-cells. The female flowers are in roundish catkins, with the scales distinctly double; the bract is adnate at the base to the ovule bearing lamina, and does not increase after flowering; but the lamina, which has two reversed ovules at its base, increases considerably after flowering.

LARIXIN'IC ACID, a volatile acid found in the bark of the larch (*Pinus larix*), natural order *Coniferae*. The acid is very crystalline, subliming at 93° (240° Fahr.) and resembles camphor. It is soluble in water and alcohol. The formula is $C_{10}H_{16}O_6$. It is very inflammable. It forms a number of crystalline salts called Lariximates.

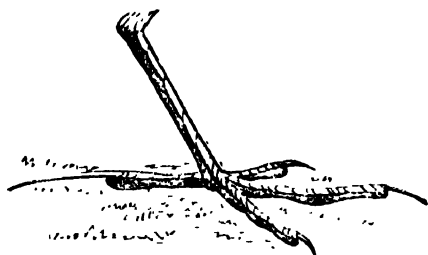
LARK (Alaudinæ) is a family of birds belonging to the order PASSERES, and nearly allied to the wagtails and pipits. There is much variation of character within the limits of the family. All the species agree in having the tarsi scaled behind as well as in front. In the wing the inner secondaries are greatly elongated, as in the pipits. The hind claw, as in the skylark (see cut), is generally very long and straight, but in some species it is remarkably short. The form of the bill varies to a remarkable degree. "There is," says Professor Newton, "abundant evidence of the susceptibility of the Alaudine structure to modification from external circumstances, in other words, of its plasticity; and perhaps no homogeneous group of Passeres could be found which better displays the working of 'natural selection.'" There are about 100 species of larks, a large majority of which are confined to the New World.

The Skylark (*Alda arvensis*) is the most common bird in Western Europe, being found in almost all unwooded districts. It extends throughout Europe and Asia

even to China, and in winter occurs in the Punjab, Persia, Palestine, Egypt, and Buxary. It has been acclimatized in New Zealand and in Long Island, New York.

The skylark has always been especially dear to Englishmen. Few, if any, of our British birds possess a more cheerful and animated song than the skylark, whose joyous notes, heard as the bird soars perpendicularly in the air, have frequently afforded a theme for the poet; indeed the power of his song is most extraordinary, as it may be distinguished long after the little body from which it issues is lost to sight, and when we may, with little help from imagination, believe him, as Shakespeare has it, to be singing at "heaven's gate." His song lasts for about eight months in the year, and during the summer he will sing the whole day through, from the first appearance of dawn till after sunset.

The skylark feeds principally on seeds, but also on insects and worms; it uses a large quantity of sand and gravel in the process of digestion. The nest is built of grasses on the ground, usually in a corn-field. The eggs are from three to five in number, of a grayish-white colour with a greenish tint, mottled with dark gray and brown. During winter the skylarks assemble in great flocks, which



Foot of Skylark (*Alauda arvensis*).

may be seen sweeping over the fields, descending into the stubbles in search of food, and sometimes attacking the fields which have been sown with wheat. It would appear that at this season our British larks are reinforced by a considerable migration from the northern parts of Europe, and when the season is severe many of those inhabiting Scotland pay a visit to the more southern parts of the kingdom. As they become fat during winter, unless the ground is thickly covered with snow so as to prevent their getting a sufficient supply of food, they are at this time regarded as a delicacy for the table, and are taken in great quantities at night by dragging a net over the stubble-fields in which they generally roost. The feathers of the back of the skylark are dark brown, with pale-brown edges; those of the top of the head are slightly elongated, forming an erectile crest; the throat and breast are pale brown with dark-brown spots, and the remainder of the lower surface is yellowish white. The male measures $7\frac{1}{2}$ inches in length; the female is a little smaller, and rather darker in colour. The hind claw is very long, and the bill rather slender.

The Woodlark (*Alauda arborum*) is distinguished from the skylark by its smaller size, its length being only 6 inches, by its finer bill, shorter tail, more spotted breast, and by a streak of light brown which passes over each eye. It is met with in cultivated districts, where there are numerous tall hedges, woods, and plantations, as, unlike the skylark, it perches freely on the branches of trees. Its song is inferior to that of the skylark in variety and power, but superior to it in sweetness. It is less enduring of captivity. The woodlark is not a very abundant bird in Britain, and is rather local in its distribution, and more plentiful in the southern counties. Its general geographical range is more restricted than that of the skylark.

The Crested Lark (*Alauda cristata*) has a stronger and more curved bill than the skylark, and is of a brown colour above and pale yellowish brown beneath, with the chin white and the breast streaked with dark brown. The crown of the head is reddish brown, and a few of the feathers are considerably elongated, forming a pointed crest. It is common in France and some other countries of Europe, but is very rarely met with in England.

The Shorelark (*Otocorys alpestris*) is a northern species inhabiting the borders of the Arctic seas in both hemispheres, and only descending into the more temperate regions in the winter. It occurs almost every winter on the east coast of Britain. The shorelark is about 7 inches in length, and has the back brown and the lower surface white; the forehead, chin, and throat are yellow; above the forehead is a black band, terminating on each side in a few elongated feathers, which the bird has the power of raising in the form of a pair of pointed ears; the cheeks and a broad crescent-shaped band on the breast are black. This bird is most abundant in North America, where it is seen in considerable flocks. Its nest is made among the moss and lichens growing on the rocks. This species and another of the same genus are the only larks found in the New World. The species of the genus *Otocorys* are known as Horned Larks; two other species are known in the eastern hemisphere.

Numerous other species of larks are known in various parts of the Old World, especially in Africa. Only one species, *Mirafra borghfieldi*, inhabits Australia, and New Zealand possesses only the skylark, which has been introduced. The name Lark has been given to several species of the nearly allied family Motacillidae, as Mud-lark, Tit-lark, Rock-lark. The American Meadow-lark belongs to the genus *Icterus*.

LARK-HEEL or LARK-HEELED CUCKOO

(*Centropus*) is a genus of Cuckoos (Cuculidae), remarkable for having the hind toe furnished with a straight powerful claw, which always equals, and often surpasses, the length of the hind toe itself. The lark-heels are distributed over Africa and Southern Asia, extending thence to the Malay Archipelago to Australia. They frequent the thick bush, living chiefly on grasshoppers, locusts, and other insects, some species also devouring lizards and small snakes. They do not share in the parasitic habits of some of their family, but build their own nest, and hatch and rear their young. The general colour of the plumage, which lies very close, is reddish-brown, the hind leg usually black.

The Senegal Lark-heeled Cuckoo (*Centropus senegalensis*), which appears to inhabit nearly the whole of Africa, is not more than 16 inches in length, and has the head, back of the neck, and upper part of the back black; the rest of the back and the wings cinnamon-red; the rump and tail feathers blackish, more or less streaked transversely with fine buff lines; the lower part of the body is buffy white. The shafts of nearly all the feathers are thick, stiff, and brilliant, giving a peculiar character to the plumage. This bird lives in pairs in the forest, and feeds upon locusts and other large insects. It breeds in the holes of trees, and the male and female assist each other in the task of incubation.

The Pheasant Lark heel (*Centropus phasianus*) inhabits New South Wales. It is a large species, measuring about 30 inches in length, of which fully half is occupied by the broad and ample tail. Its general colour is a rich brown, with streaks and bars of buff. It builds a large nest of dried grasses, usually in the midst of a tuft of grass. The nest is domed, and furnished with two openings, through one of which the head, and through the other the tail of the female protrudes while she is engaged in the work of incubation.

The Red-winged Lark heel (*Centropus rufipennis*) is a

common species in India and the eastern islands, known to the European residents in India as the Crow Pheasant. It feeds on insects, and also cutipedes, lizards, and small snakes. The nest is placed in a thick bush or tree; it is very large, domed, and furnished with a single opening in the side.

LARKSPUR (*Delphinium*), an extensive genus of herbaceous plants belonging to the order RANUNCULACEÆ. The species abound in the temperate parts of the northern hemisphere, and are often cultivated in gardens. Among the most showy kinds are *Delphinium Consolidæ*, a hardy annual, of which many varieties are known as Rocket Larkspurs: the name was given in reference to its supposed power of consolidating or healing wounds; *Delphinium formosum*, with blue flowers; *Delphinium cardinale*, with scarlet flowers; and the Bee Larkspurs, consisting of *Delphinium grandiflorum*, *Sibiricum*, *Chinense*, *mosaicum*, and many more. The Bee Larkspurs derive their name from a striking resemblance of the petals to the black body of a humble bee covered with yellow hairs, the head and legs of the insect being supposed to be immersed in the cup of the flower.

Delphinium Ajacis is so named from markings on its flowers, supposed to resemble the Greek letters ΑΙΑΙ. For the same reason it has been identified with the "hyacinth" of the ancients, and with reference to this Dr. Daubeny comes to the following conclusion—"that the term *hyacinthus* was in general applied to some plant of the lily tribe, but that the poets confounded with this the larkspur, which has upon it the markings alluded to; and that the name hyacinth was given, in the first instance, to the plant which most distinctly exhibited them." In this genus the calyx is coloured, and has the appearance of a corolla; there are five sepals, and the upper one is prolonged into a spur. There are two or four petals concealed within the calyx. The fruit consists of one to five many-seeded follicles.

LARNE, a seaport and market-town of Ireland, in the county of Antrim, beautifully situated at the entrance to Lough Larne, about half a mile from the shore, and 18 miles north-east of Belfast. It is extending rapidly. There are eight places of worship, a handsome town-hall, a large bleaching establishment, an agricultural model school, and a masonic hall, erected in 1867. A large and commodious market-place was built in 1861. Larne is connected by railway with the Northern Counties line, and it has a good natural harbour for small vessels, in which great numbers from Scotland anchor while waiting for their cargoes of lime from the extensive adjoining works of Magheramara. A good deal of iron, raised in the vicinity, is now shipped from the port. Fish is abundant near the town, especially mackerel, cod, lake, and mullet. Larne is connected with Glenarm and Cusendall, two small and neat towns on the coast, by a road constructed by the government Board of Works, which runs close upon the beach at the base of some of the grandest cliffs in the world, and opens up a continuous succession of beautiful views. The population of Larne in 1881 was 4716. The ancient name of the town was *Inver*, an inlet. It was here that Edward Bruce landed in 1315.

LARNE, LOUGH, is a gulf 5 miles long by a half to a mile wide, formed by the mainland and the peninsula of Island Magee. The shores are low and flat, and the anchorage good; but the entrance is very narrow, and the coast outside rock-bound.

LARVA, in its most general sense, is the term applied to the embryo of an animal which leads, for a longer or shorter period, an independent life, for which it presents special modifications of structure which have no reference to the requirements of the mature animal. Many animals are not born till they have attained the general structure of the parent, and are, if active, able to lead the same life.

Other animals, when they emerge from the egg, differ in appearance and structure from their parents, display different instincts, and only by a gradual metamorphosis come to display the characters and habits of their species. It is only to embryos of the latter animals that the term Larva is properly applicable. In the star-fishes and sea-urchins (and other animals belonging to the sub-kingdom ECHINODERMATA) such a metamorphosis is seen in an extreme form. The organs of the body of the star-fish or sea-urchin are formed afresh within the body of the larva, which then withers up. A similar mode of development obtains in many worms, especially among the parasitic forms. Many crustaceans, including some of the crabs and prawns, have a free-swimming larval form which, by modification and development of its organs, grows into the mature animal. Some molluscs also have a special larval form, which swims freely by means of the cilia which cloak the parts of the body. The tadpole of the frog, with its long fish-like body and horny beak, is a familiar instance of a larva.

The term Larva is often restricted to the embryos of insects immediately after their exclusion from the egg. Special terms are generally given to the larvae of insects, such as grub, maggot, and caterpillar. Grub appears to be a general term analogous to larva; the term maggot is most generally applied to a larva which is footless and almost inactive, as in the social bees; and caterpillar, in the most common acceptance of the term, is used to designate the larva state of butterflies and moths. These three terms, however, are used in a very vague manner.

Though the Larvæ of insects never possess wings, they vary much as regards the development of the locomotive organs; and as these are more or less perfect, so does the larva resemble or recede from the insect in its mature state. Hence larvæ may be divided into two sections: those which in general form more or less resemble the perfect insect, and those which are unlike the perfect insect. The larvæ of both sections moult, or cast their skin, several times during their progress to maturity. The number of moults varies according to the species, and the period intervening between the moults depends upon the length of the insect's existence in the larva state. In these moults not only is the whole external covering of the insect cast, but even the lining of the intestinal canal and of the tubes of the tracheæ is shed.

In most insects the larvæ display the most striking difference in form and habits from the *imago* or perfect insect. When the larva has attained its full growth it undergoes a metamorphosis, becoming a *pupa*, which is often inactive and takes no food. In some insects the pupa is enclosed in a skin, which allows the parts of the future insect, including the rudimentary wings, to be seen through it; in others, as butterflies, the whole pupa is inclosed in a horny envelope, so as to render the body (with the exception of the hinder part of the abdomen) incapable of any movement. In all cases, after a longer or shorter period, the pupa skin is burst, and the *imago* emerges, perfect in all its parts, except that the wings are small and incapable of immediate flight.

In insects of the orders Orthoptera and Hemiptera (grasshoppers, cockroaches, and bugs) there is no true pupa state. The larva often differs little from the perfect insect, save in the absence of wings, and can hardly be called a larva at all. The wings gradually appear on the sides of the body, as the larva goes on moulting; after the final moult the perfect insect appears.

LARYNGOSCOPE, an instrument used to explore the recesses of the larynx and the upper part of the windpipe. In its simplest form it consists of a small reflecting mirror placed on a stalk attached to its margin at an angle of from 120 to 150 degrees. The stalk is made of flexible metal, so that it may be readily bent into any shape that

may be required. When used this mirror is placed against the soft palate and uvula, the tongue being drawn well forward, and upon it are thrown strong rays of light from the sun or any source of artificial light by means of a reflector. This reflector is so manipulated as to throw the light downwards into the throat, and at the same time to exhibit upon the mirror at the back of the mouth an image



Mode of using the Laryngoscope.

of the parts affected. The laryngoscope, which was introduced to modern medical practice chiefly by the labours of the German physiologists Drs. Turek and Czerniak, has proved of immense service in the treatment of many diseases of the throat. By its means the condition of the

parts examined can be ascertained with the greatest accuracy, and remedial agents can now be applied to the lining membrane of the organs, and the removal of polypi or other tumours can be effected with a precision previously unknown.

LARYNX is the organ of the voice. Its framework is composed of five cartilages, which are capable of being moved on each other in various directions by muscles, so as to act upon two elastic bands, on which the voice essentially depends, and which are called the vocal ligaments.

The first the thyroid cartilage (2, 2), consists of two plates of dense, tough, fibro-cartilaginous substance, of an irregularly quadrilateral form, united at the lower part of their anterior edges. The prominence of this angular union is felt in the front of the throat, forming what is called the Pomum Adami (Adam's apple), at the sides of and behind which the form of the cartilage may be easily traced out with the fingers.

The cricoid cartilage (3, 3) has somewhat the form of a signet-ring. It is inclosed within the angle of the thyroid cartilage, beneath whose lower edge the front and narrowest portion of its ring may be felt, with an interval of about a quarter of an inch between them.

The arytenoid cartilages have each the form of an

irregular triangular pyramid (4, 4). They are placed upon the upper edge of the broad part of the cricoid cartilage, just within the most expanded part of the angle formed by the receding plates of the thyroid.

The epiglottis (5) is of a somewhat ovate form. It is attached by its apex to the angle of union of the plates of the thyroid cartilage, and projects obliquely backwards and upwards over the cricoid and arytenoid cartilages, like a shield, guarding them from the contact of foreign bodies passing from the mouth.

These cartilages are connected chiefly by elastic ligament, which is arranged in bands of varying thickness throughout the whole of the larynx, uniting the upper edge of the thyroid cartilage to the os hyoides, and its lower edge to the cricoid cartilage; passing also from the arytenoid cartilages to the epiglottis, and uniting the rings of the trachea and bronchi; affording to all a firm but yielding connection and endowing them by its elasticity with the power of resounding in accordance with the vibrations originating in the vocal ligaments.

The vocal ligaments are two narrow bands of highly elastic tissue, stretched between the anterior angle of the thyroid and the anterior surfaces of the arytenoid cartilages. The substance of which they are composed is a yellowish,

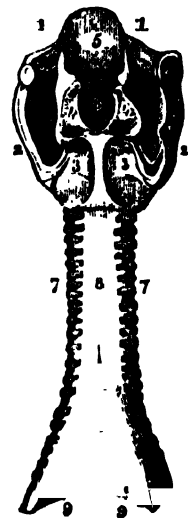


dense, fibrous tissue, which is placed in those parts of the body where a permanent elasticity is required, as in the spaces between the laminae of the vertebrae, the coats of arteries, the rings of the trachea, &c. The accompanying figure represents the cartilages and muscles of the larynx (omitting the cornua and the epiglottis) as seen after dissection, from above. The muscles are here designated by numbers, the cartilages by letters, viz.:—1. The crico-thyroidens (at the rima of the glottis). 2. The thyro-arytenoidens. 3. The crico-arytenoidens posterior. 4. The crico-arytenoidens lateralis. 5. Half of the arytenoidens transversus and of the obliqui. A. The thyroid cartilage. B. The cricoid. C. The arytenoids. D. The vocal or inferior laryngeal ligaments. E. The ligaments which tie the arytenoids to the cricoid.

The muscles acting on the parts of the larynx just described are arranged symmetrically, and attached to corresponding points on each side of the larynx; and their names are compounded of those of the cartilages on which they are inserted.

The simplest actions of these muscles in regard to the voice may be thus stated: the crico-thyroid stretch the vocal ligaments; the thyro-arytenoid relax them; the posterior crico-arytenoid open the glottis; the lateral crico-arytenoid and the posterior arytenoid narrow or close it.

Below, the larynx opens into the trachea or windpipe, which is continued into the chest, and there divides into two branches, the bronchi, whose ramifications and terminations form the air-passages and air-cells of the lungs.



Section of the Larynx.

1, 1, Os Hyoides; 2, 2, Thyroid Cartilage; 3, 3, Cricoid Cartilage; 4, 4, Arytenoid Cartilages; 5, Epiglottis; 6, Aperture of communication between Glottis and Pharynx; 7, 7, Rings of Trachea; 8, Situation of transverse posterior Muscular Bands; 9, 9, Portion of Trachea (windpipe) cut open from behind.

The trachea is composed of a series of cartilaginous incomplete rings, which are united behind by muscular fibres, and are connected together by longitudinal elastic bands. It is thus capable of variations both of length, breadth, and tension, and of entering into vibrations with the column of air contained in it, and of assisting in communicating those vibrations through its branches to the walls of the chest.

The larynx has been compared to a variety of musical instruments, and it will be seen that in its different parts it unites the principles of several. In its essential vocal apparatus it most nearly resembles the reed instruments, as the reed-pipes of the organ, the clarinet, &c., or rather a modification of them, in which the vibrating body is not fixed in its dimensions as a metallic tongue, or a reed, but consists of a lamina of elastic membrane, capable of varied degrees of tension, as well as of alterations in its length. No musical instrument has yet been constructed on this principle, unless we consider as such the various kinds of trumpet in which the vibrations are produced by the air impelled against the edges of the lips, rendered more or less tense by the action of the orbicular muscle. The principle has been applied in the formation of artificial larynges by Biot, Guenard de la Tour, Willis, &c., who have chiefly used cat-gut or membrane; and by Muller and Henle, who have employed besides, either the vocal ligaments themselves or laminae of the elastic coat of an artery.

The notes produced by the glottis are subjected to modifications in timbre, strength, and purity, by the parts connected with the larynx, both above and below the vocal ligaments; but it is difficult to determine the circumstances on which the differences of the timbre of the voice in different parts depend. The difference between the male and female voices is probably owing to the comparative shortness of the vocal ligaments in the latter. According to Muller, their average length in man is 18 millimetres, in woman only 12½, or nearly as 3 to 2. The voices of children resemble very nearly those of women, but in males a remarkable change takes place at puberty, when the voice is said to crack. The change from the shrill treble voice of the boy to the fuller and rounder tone of the man is sometimes perfected almost suddenly; but in most cases it is for some time in progress, wavering between the two extremes, deep and mainly during quiet conversation, but when any exertion is used, suddenly starting up again to the shrill tones of boyhood. In old age, the cartilages of the larynx becoming bony, the ligaments hard and unyielding, and its muscles becoming powerless, the voice completely alters, and it resembles as if there were not sufficient strength in the vocal cords to draw a due tension of the vocal ligaments. It is, being subservient to the voice, the larynx fulfils other functions of vital importance to the whole body. In breathing, for example, its exquisite sensibility is immediately excited by the contact of any foreign substance, or of a cold bracing gas, and the glottis is firmly closed by the two arytenoid muscles, to prevent the entrance of the noxious body into the lungs. The same action occurs as we swallow each portion of our food, to prevent any of it passing into the lungs; and if a particle by accident touch the glottis, coughing is excited, to insure its speedy removal.

In 1855 Mr. Leucox Browne obtained the first photograph of the larynx, with the vocal organs in the act of vibrating. The apparatus comprised an arrangement by which a beam from an electric lamp could be thrown by means of mirrors into the larynx, and the image of the upper part of the larynx, with the vocal chords stretched across it, projected onto a photographic camera, where it was received on a sensitive plate.

Diseases of the Larynx.—The principal diseases of the larynx are aphonia, croup, diphtheria, acute and chronic laryngitis, and oedema or swelling of the glottis. Aphonia, or the loss of voice, may arise from several causes, and very often it is found as a symptom of

certain nervous disorders. In the latter case there is no morbid change in the larynx, or affection of its muscles and nerves, and with an improvement in the general health the voice returns of itself. Where it arises from over-exertion of the voice rest and change are valuable accessories to the local treatment, which must be varied according to the condition of the throat. CROUP and DIPHTHERIA have already been noticed in this work under their respective headings. Laryngitis, or inflammation of the larynx, is most frequently caused by exposure to cold and the inhalation of irritant gases, or by direct injury to the larynx, as from the attempt to swallow scalding water, &c. It is in its acute form a very dangerous disease, as the narrow passage through which respiration is effected is readily obstructed, and great difficulty in breathing arises. Whenever it supervenes upon a cold the patient quickly feels that he has become the victim of a more serious illness. There is a feeling of soreness in the throat, great difficulty and pain in swallowing, and there is a sense of constriction about the rima. The breathing becomes difficult, the inspirations and expirations being of a prolonged character and following each other without pause, except when they are interrupted by the spasms of deep croupy-sounding cough, attended by expectoration. There is also a rapid pulse and a slight rise of temperature, though other indications of an inflammatory fever may be slight or absent. When the throat is examined by the laryngoscope the whole interior of the larynx is seen to be of a bright-red colour, and sometimes considerable swelling may be perceived. If the disease progresses unfavourably the breathing becomes increasingly difficult and suffocative paroxysms are experienced, attended with great anxiety and distress. Owing to the imperfect aeration of the blood the lips become blue, drowsiness sets in, the face becomes livid and is bathed in perspiration, and death occurs probably in a fit of suffocation. Occasionally the disease is so rapid in its progress that death occurs within a few hours, while in others it takes place at the end of two, three, or four days. As soon as the first indications of laryngitis are observed the patient should be confined to a warm room; poultices should be applied to the throat; steam, plain or medicated, should be inhaled; and if the symptoms increase in intensity emetics must be administered and the throat bled. If suffocation appears imminent the operation of tracheotomy is called for, and where the disease consists of simple laryngitis only, and due care is taken, it is very frequently successful. Where the disease occurs in a mild form it may subside favourably in a few days, but great care should always be taken lest there be any setting in of more dangerous symptoms. Chronic laryngitis is marked by hoarseness and loss of voice, a dry hacking cough, and a slight pain in the throat. It sometimes follows acute laryngitis, but it most commonly arises from exposure to cold. Treatment consists in use of inhalations, the application of a lotion made by dissolving 40 grains of nitrate of silver in an ounce of water every other day by means of a throat sponge, assisted by rest and attention to the general health. Oedema of the glottis, which forms one of the commonest symptoms of laryngitis, may also arise from other causes, and where it is severe the operation of tracheotomy must be resorted to, or the parts must be scarified by means of a long curved bistoury, provided with a cutting edge only at the point.

LAS CASAS, BARTOLOMMEO DE. See CASAS.
LAS CASES, EMMANUEL AUGUSTIN DIEU-DONNÉ, COUNT DE, a French historian, and one of the companions of Napoleon at St. Helena, was born near Revel, in Languedoc, in 1766. He first entered the navy, and was present at the siege of Gibraltar. At the Revolution he fled to England, and served in the expedition to Quiberon. After Napoleon's accession he returned to France, and laboured in the preparation of his admirable

"Historical and Geographical Atlas," published under the name of Le Sage. The emperor found out his good qualities, made him his chamberlain, created him a count of the empire, and employed him in inspecting hospitals, prisons, and naval ports. After the battle of Waterloo he begged to be allowed to leave his wife and share Napoleon's exile. While in the island prison, he spared no effort to alleviate the pains of his captive master. Constantly talking with Napoleon upon events of his past career, at night he jotted down the conversations of the day. The result is the "Mémorial de Ste. Hélène." In 1816 he was sent away from St. Helena, on account of a letter which he contrived to send to Lucien Bonaparte, in which he commented on the treatment of the illustrious exile. After eight months' confinement at the Cape of Good Hope he was released. Under Louis Philippe's government he was a member of the Chamber of Deputies for St. Denis. He died 15th May, 1842. The Memorial is very interesting, as showing what Napoleon thought of his own career, or what he wished others to think; but as material for history it is of course utterly untrustworthy. Napoleon seems not to have known the meaning of the word truth.

LASSA or **LHASA** (meaning the "pillar or seat of divine intelligence") is the capital of Tibet and the central city of Buddhist believers. It stands on a plain surrounded by mountains, at the height of 11,700 feet above the sea, and on the river Kichu-Sanpu, which runs south-west to join the Brahmaputra, about 360 miles north-east of Kathmandu, the capital of Nepal. The principal part of the city has wide, regular, and clean streets; but the suburbs are ill-built, mean, and irregular. In the city the houses are lofty, whitened on the outside, with the doors and windows painted red or yellow. At the distance of a mile north of the city there is a rugged hill rising 367 feet above the plain, called the Buddha Mla, or Buddha's Mountain. On it stands the large palace of the Dalai, or Tali Lami, to whom divine honours are paid as a living incarnation of Buddha. It consists of several temples surrounding a central one, a storey higher than the rest, and terminating in a canopy covered with plates of gold, outside of which there is a gallery with a gilded colonnade, from which the temples and courts, the city and plain, and the surrounding mountains can be seen. A fine avenue of trees leads from the city to the temple; the other temples are the residences of numerous subordinate lamas, whose duty is to conduct services in honour of the Grand Lama, and while the city, in its streets and bazaars, is the scene of constant bustle, the profound silence of devout worship reigns all around the great temple. The Buddhist priests live in monasteries, and these are numerous in and around the city; in one, in the centre of the city, there is a printing establishment, from which many religious works are issued. As the centre of the Buddhist religion the city is the resort of pilgrims from all parts of the East. The monasteries are also schools of learning, and are attended by students from all parts of the Buddhist world. Many of them are very beautiful and richly endowed. There is a summer palace, with lake and park, at some distance from the city, where the Lama occasionally resides. The merchants of the place are chiefly Mohammedans and Parsees, who bring British goods, linen, cotton, cutlery, and bijouterie from Calcutta, and the products of China with Russian goods from Turkestan, and thus carry on a large trade. The fixed population consists in a great measure of the priests and the students; the rest are chiefly those in various ways engaged in the large traffic of which the city is the centre. Various travellers and missionaries have succeeded in reaching this sacred city from time to time, but the most trustworthy account of it is that given by Pundit Nain Singh, who had been trained in the Indian survey department, and who visited Lassa at the end of 1874.

VOL. VIII.

LASSALLE, FERDINAND, the German political agitator whose brief career has produced such tremendous results in the so-called "social-democratic" movement of Germany, was a Jew, son of a prosperous tradesman in Breslau. He was born in 1828, studied chiefly at Berlin, became an ardent follower of Hegel, and wrote a tolerable treatise on Herakleitos, the Greek philosopher, from the Hegelian standpoint. In a journey to Paris he met Heine, who took a fancy to him, and when he was returning to Germany introduced him to Varnhagen von Ense in a most complimentary letter. Lassalle thus became presented to the best literary and political circles in Germany. In 1845 he met a distinguished political lady, the Countess Hatzfeldt, long separated from her husband, and badly treated by him. Lassalle saw an opportunity. He stood well with the countess (much older than himself), and he believed her cause to have merits in it. He studied law expressly to help her, and as soon as he was ready he attacked her husband in all directions, pursuing him from court to court, till he got a triumphant verdict in the lady's favour. Bar-scandal, already busy, was beside itself when Lassalle appeared in the dock with accomplices who had stolen a casket of valuables from the count, in pursuance of some of the schemes against him. Lassalle got off, but his fellows went to prison as mere thieves. Backed now by the grateful countess, Lassalle plunged into the stormiest of politics and the gayest of fashionable life. He avowed in private that his dream was to be president of a German republic. But he was a sort of Napoleon in politics; his ambition was a mere vulgar selfishness raised, as mathematicians would say, to a higher power. He got his work published in 1858, wrote another, a heavy production of no value, on the "System of Acquired Rights," in 1861, went to prison now and again, and lived a purposeless boisterous life, always keeping among the most luxurious and fashionable society.

It was this frequenter of ball-rooms and assemblies who in 1862 suddenly posed as the future saviour of society by means of the "working man." It was nothing to him that the working man cared little about him, and refused to be taken in by his promises or his arguments. He believed he had a new electioneering cry, and he made the most of it. He had really considerable gifts, some learning, and unlimited audacity. In only two years he made a new movement which has already lived a quarter of a century. This is the "social-democratic" movement, which aims at the total overthrow of German society. Property is to be abolished, all men are to work for their living (no bad thing this), the tyranny of capital is to cease. Simplicity and equality are to reign for ever. Thus preached Lassalle, while he gave the most exquisite suppers to be feasted upon in Berlin. A handsome high-spirited girl, Fräulein von Dönniges, was attracted by him, and at once engaged herself to him. Her parents, Christian, noble, and anti-revolutionary, held her a close prisoner, and by some deceit contrived that she should break the engagement with the Jew democrat. The latter challenged a new suitor to the lady's hand who had come forward, a duel was fought, and Lassalle was killed near Geneva, 28th August, 1864.

Since his death his name has been a battle-cry. Prince Bismarck used him as a tool while he lived, and used his name still more after his death. The vast loan of 100,000,000 thalers which he demanded to start his new working-man era (£15,000,000) has never been levied, but it serves occasionally to be talked about when it is necessary to divert people's attention from serious matters. The best sketch of the man, though rather too flattering, is in the remarkable novel by George Meredith, "Tragic Comedians," where the whole story is told (under changed names) in the most masterly manner. An imitation of Lassalle's "social-democratic" movement began in England about twenty years after his death, of course without any practical effect. See SOCIALISM.

LAS'SO, a rope with a noose at one end, used in South America and other countries for capturing wild horses, &c. It is generally made of a stout thong of hide, and requires much skill in use. Another kind, still more common in South America, is a long cord of skin, with a leaden ball at each end, which is thrown by the hunter at full gallop, so that when it strikes the leg or neck of the animal he is pursuing the momentum of the ball causes the lasso to coil round the limb. The lasso has sometimes been used in warfare.

LAS SO, ORLANDO DI, or ORLANDUS LASSUS, the Italian and Latin names respectively of a famous early musician, the chief ornament of the Netherlands school, whose real name was probably Roland de Lattre. He was born in 1530 at Mons in Hainault, and like so many of his contemporaries and fellow-countrymen, was tempted to Rome, greedy to absorb this new diviner art of the North and turn it to account in church service. In 1551 he was appointed, as a famous musician, musical director of the first choir in Rome, that of St. John Latrari, in the very year that Palestrina, who was almost a month his contemporary, first began to make known his power, and received the appointment of conductor of the Galiani choir in the Vatican. All through his life De Lattre kept the same relative position with Palestrina. For him the smiles of patronage for Palestrina the ill-paid drudgery of life. Possibly, it is true, has reversed their positions, and hundreds have used and love Palestrina's music who never heard or saw anything of De Lattre's; but the hope of the recognition of posterity does not touch a man in the landships of life. At Rome De Lattre was patronized by the learned Alessandro of Florence, and resided with him. He was much favoured by the illness of his father, and though he found difficulty to Mons he was already a scholar. He visited England with an Italian nobleman, Giovanni de' Medici, in 1564, and on his return was introduced to the famous Cardinal Palestrina. He wrote a motet in Palestrina's organ on the words "pater" thus—

Respectant, Rezinalde, p. 11, &c.

("The pater noster, then, O Rezinalde, the stars smile upon thee, &c.") He soon returned to his native country, and composed a number of compositions with great reputation, most of the noblest published at Antwerp. Records remain of the extent, in which his gentle manners no less than his talents made him loved. His fame spread far and fast. Albert the German, duke of Bavaria, invited him to his court at Munich, to direct his band of some thirty performers, vocal and instrumental. He accepted the post in 1557, and in 1558 married one of the pupils of Palestrina. He was petted and fêted and universally loved. We can now judge coolly, but we must admit that no one in his day could write like him save Palestrina alone. These two dominated the musical world, but the fame of the one was essentially Roman, that of the other European. The Emperor Maximilian conferred letters of nobility on De Lattre. The Pope (Gregory XIII.) made him a knight of the Order of the Golden Spur. The Elector of Saxony offered him anything he pleased to name to direct the Roman Catholic faith, and come to Dresden to write music for the Protestants. And as Charles IX. of France had enjoyed his music and the charm of his society in a first visit to Paris in 1571, it was to him that he turned for consolation when the horrid memories of the Bartholomew massacre (1572) well-nigh maddened him. The second visit to France, at the king's own command, was in 1574, but while De Lattre was yet on the road the unhappy monarch died. De Lattre returned to Munich and served the Generous Albert and his successor the Pious William faithfully. He died the same year as Palestrina, 1594; but the last few years of his life seem to have been overshadowed by gloom, made melancholy by a decay of

his faculties and the loss of those wonderful spirits which had smoothed the way of the world for so many years. As time goes on the reputation of De Lattre rises once more. Fétis, in especial, studied his music and was the cause of much being re-published. The mass of it is enormous, for like all great musicians he was phenomenally prolific. A considerable amount is now easily accessible. Several pieces are really noble strains of musical thought, even to our modern ears.

LAST. A last of cod fish, white herrings, meal, and ashes is twelve barrels; a last of corn is ten quarters, or eighty bushels; of gunpowder, twenty-four barrels; of red herrings, twenty cades; of hides, twelve dozen; of leather, twenty dickers; of wool, twelve sacks; of flax or feathers, 1700 lbs. A last generally is estimated at 4000 lbs.

LASTREA is a genus of FERNS nearly allied to Nephrodium, but differing in having the veins free, instead of meeting again; it differs from the free-veined Polystichum in the indusium being kidney-shaped, instead of peltate. Several of our British ferns belong to this genus, e.g. the Male Fern, the Sweet-scented Mountain Fern, the Marsh Fern, the Hay-scented Fern. The male fern (*Lastrea Filix-mas*) is, next to the bracken, the commonest of our native ferns; the rhizome, or underground stem, is used to get rid of intestinal worms. The young fronds were formerly called "St. John's Hands," and were gathered on St. John the Baptist's Day as a protection against witchcraft.

LATAKIA or **LADIKI'YEH**, the ancient *Laodicea ad Mare*, is a town of Syria, situated opposite the island of Cyprus and 90 miles south-west of Aleppo, consisting of an upper and lower town. In the former the streets are narrow and irregular, the houses low, with flat roofs, and many of them in a ruinous state in consequence of the frequent earthquakes, while the latter has two streets running parallel to the shore, inhabited by sailors. The triumphal gate of Latakia is one of the greatest ornaments of the place. It consists of four large pillars in the Roman style, with a handsome entablature, and dates from the later Roman times. The harbour, a mile west of the town, has a narrow entrance, is large and well protected, but greatly encumbered by sandbanks, mud, &c. Tobacco is extensively cultivated, and is famous throughout the East; silk is also raised, and there is a valuable sponge fishery. Latakia is the site of an American Christian mission, and a sixth of the people are Christians. It is also the residence of several European consular agents.

The ancient *Laodicea*, so named by its founder, Seleucus Nicator, in honour of his mother, was a town of considerable importance before the conquest of Syria by the Romans. It was visited by Julius Caesar when on his way from Egypt to Pontus, and is styled *Julio-polis* on some of its medals. During the civil wars, Dolabella with his fleet and army was shut up in it by Cassius, and obliged to surrender. It became a bishop's see early in the Christian era, and was held by the Christians when the Crusaders invaded Syria. It was afterwards included in the empire of Saladin, and was finally added to the Turkish dominions by Selim I. in 1517. The ruins of the ancient city fully attest its size and grandeur, and offer ready building materials to the modern inhabitants. See *LAODICEA*.

LATANIA, a genus of PALMS of the tribe *Borassæ*. *Latania Commersonii*, remarkable for its red-coloured leaves, is a native of the Isle of France. *Latania Commersonii* and *Latania borbonica* are moderate sized, with all the leaves of a palmate fan shape. The leaves, like those of other palms, are employed by the natives for covering their huts, as well as for making fans and umbrellas. The leaf-stalks are split, and employed for making baskets, sieves, &c.

LATENT HEAT. When a body is exposed to the action of heat so as to change its state from solid to

liquid, it rises to a certain temperature, known as its *melting* or *fusing* point, and remains fixed at that temperature until the whole of the solid has been liquefied. The heat applied after the fusing point has been reached does not raise the temperature, but is exhausted in producing the change of state. During this operation a quantity of heat must evidently enter the body in order to produce liquefaction, and as it produces no effect on the thermometer it is said to be *combined* and rendered *latent*, and, moreover, when the body again becomes solid the heat thus *latent* is given off in a sensible form.

A pound of water at 174° Fahr. added to a pound of water at freezing point (32°) produces, of course, two pounds of water at 103°. But a pound of water at 171° F. added to a pound of ice at 32° (freezing point) produces two pounds of water at freezing point. Heat, then, has disappeared in the production of a change from solidity to fluidity. Since a pound of ice at 32° absorbs 142° in becoming a pound of water at 32°, it follows that the same quantity of heat is given out or rendered sensible when the water again passes into ice.

The cold of winter is considerably mitigated by the sensible heat which is given out by freezing water, and when the temperature rises with the return of milder weather a considerable portion of the heat is employed in producing liquefaction.

Similar phenomena accompany the liquefaction of other bodies. When a mass of lead, for example, is put over the fire, it rises to 620° Fahr.; it then begins to fuse, and it remains at that temperature until the whole mass has become liquid; the heat absorbed and rendered latent during the process is called the *latent heat of fusion*. The following table gives the latent heat of certain liquids:—

	Deg. F.		Deg. F.
Water,	112.65	Bi-smuth,	22.75
Nitrate of soda, . .	113.31	Sulphur,	16.85
Nitrate of potash, .	85.26	Lead,	9.65
Zinc,	50.63	Phosphorus,	9.05
Silver,	37.92	Mercury,	5.11
Tin,	25.65		

It will be seen from the above table that the latent heat of ice is very considerable, while that of lead is very small; hence ice melts slowly, lead rapidly. Ice cannot melt until it has received as much heat as would raise its own weight of water 142.65°, while lead melts with as much heat as would raise its own weight of water 9.65°. Did ice melt with the same comparative facility as lead, the first thaw would cause inundations by the sudden melting of the snow and ice of winter.

Latent Heat of Evaporation.—When a liquid passes into the state of vapour there is a further absorption of heat called by this name. During the whole time that water is passing off in the form of steam the thermometer remains fixed; in other words, the steam is of the same temperature as the boiling water. Under a steady continuous heat it takes about five and a half times as long to convert the water into steam as it does to raise it from 32° to 212° (freezing point to boiling point), and therefore the latent heat of steam is about $5\frac{1}{2} \times 180 = 990^\circ$.

This enormous quantity of latent heat is again given out when steam condenses into water, and hence steam becomes a powerful source of heat. Indeed, any given weight of water in the form of steam at 212° in being condensed will raise five and a half times its own weight of water from 32° to 212°.

Water furnishes a much larger amount of vapour, bulk for bulk, than any other liquid, a cubic inch of water at 212° expanding to 1696 times its volume, or nearly a cubic foot of steam at the same temperature; whereas a cubic inch of alcohol, boiling at 173°, forms only 528 cubic inches of vapour; ether, boiling at 95°, produces

only 298 cubic inches of vapour; and oil of turpentine, boiling at 314°, produces only 193 cubic inches of vapour. Now although the latent heat required to convert such liquids into vapour is much less than that required to convert water into steam, no advantage would be gained in employing them as prime movers, supposing they were as cheap as water, on account of their low expansive force, which must evidently depend on the bulk of vapour produced from a given bulk of liquid.

The latent heat of evaporation differs as widely with gases as that of fusion with liquids. The following are the latent heats of a few gases, given in the form of the number of pounds weight which the latent heat of evaporation would, if applied as ordinary heat, raise one degree in temperature. Steam, as we have seen, takes about 990° of latent heat, or to be exact 963°. That is to say, to make 1 lb. of boiling water into steam the same temperature absorbs as much heat as would raise 963 lbs. of water 1° Fahr. in temperature, or 1 lb. of water 963° in temperature. The same rule applies to the other gases in the table.

	Deg. F.		Deg. F.
Water,	963	Carbon bisulphide, . .	156
Alcohol,	374	Turpentine,	135
Acetic Acid,	183	Bromine,	90
Ether,	162	Iodine,	45

LAT'ERAN, the name of a church, Basilica Lateranensis, with a palace and other buildings annexed to it, situated at the south-eastern extremity of Rome, near the walls of Aurelian and Honorius. This group of buildings is called "in Laterano," from being built on the estate once belonging to Plautius Lateranus. The later emperors had a palace on the spot, and Constantine had a church or chapel annexed to the palace. Constantine, or some of his successors, gave up the palace to the bishops of Rome, and the Lateran, till the beginning of the fourteenth century, was the residence of the pope. The Pope held a council of bishop of Rome, goes to take solemn possession of it after his election, and he officiates there on certain great festivals, for which reason it is styled the "head church in the world," *Eccl. Romana Urbis et Orbis Mater et Caput*.

A fire broke out in it in 1695, which consumed the greater part of the palace, as well as the church. The church was restored, but the palace was abandoned, and Gregory XI., when he transferred the papal see to Rome in 1377, fixed his residence in the Vatican palace, which then came to be considered as the residence of the pontiff till the seventeenth century. Sixtus V., however, in 1586 ordered a new palace (the present structure) to be built, adjoining the Lateran Church, and Pope Pius IX. converted a portion of it into a museum of Christian archaeology. In a separate building on the north side of the church, erected from Fontana's design, stands the *Scala Santa*, or "Holy Stairs," consisting of twenty-eight marble steps, which are believed to be the identical ones which Christ descended when he left the judgment seat. They are only allowed to be ascended by penitents on their knees, and are protected by a wooden casing. In this matter the tradition is unusually well founded, for these steps are undoubtedly those which St. Helena, the mother of the Emperor Constantine, brought from Jerusalem not more than 300 years after the crucifixion of Christ. As they formed part of a Roman public building (pætorium) there seems no valid reason for disputing their authenticity.

LATERAN COUNCILS. Many of the councils of the Church of Rome have been held at the Lateran, some special, some general or œcumenical. The chief are the following:—Council to condemn the Monothelite heresy, held 649; to depose and excommunicate the Bishop of Pesto, 864; to canonize the Bishop of Augsburg, 993; to sign the treaty yielding the right of investiture to the Emperor Henry V. (Paschal II. being a prisoner), 1111;

to revoke the last-named (Paschal being now free), 1112; further to repeat the condemnation of imperial investiture and to excommunicate the emperor, 1116.

General Councils (Œcumenical).—The first œcumenical council of the West was held at the Lateran by Calixtus II., 1123. The second Lateran general council, to condemn Arnold of Brescia and unite the church, Innocent II., 1139; the third, to reserve to the cardinals the power to elect the Pope, and to proclaim crusade against the Albigenses, Alexander III., 1179; the fourth, to ordain confession, to check new religious orders, and to deal with sundry political matters, Innocent III., 1215; the fifth, to annul acts of Council of Pisa, Julius II., 1512, Leo X., 1513. In its continuation this council abolished the Pragmatic Sanction and confirmed the Concordat with Francis I.

LATERITE is an earthy ochreous rock, of a red or rusty brown colour, that occurs associated with basaltic flows. In most cases it is evidently the altered and disintegrated surface of the basalt; sometimes this metamorphism has taken place *in situ*, in other cases the rock has been transported and redeposited in water. Some thin beds of laterite appear to have been beds of earth or vegetable soil that were baked and indurated by the overflowing hot basalt. Some of the laterites of Madeira are of this class.

Peroxide of iron is the colouring ingredient in laterite; in some instances the percentage is sufficiently high to constitute a poor iron ore. Nodules of hematite and beds of bauxite occur in some laterite. Bole is a variety of laterite.

Laterite occurs abundantly, but generally in thin beds, in the tertiary basalt of North-east Ireland and Scotland. Numerous deposits of laterite occur in parts of India, where it contains much iron; but geologists are not agreed as to its mode of formation.

LA TES is a genus of fishes belonging to the PERCH family (Percidæ), of which there are three well-known species. *Lates niloticus*, a large fish found in the Nile and other rivers of tropical Africa, is supposed to be the fish mentioned by Strabo as forming the object of worship at Latopolis, or Enné, in Egypt. The *Lates calcarifer* is the perch of the Ganges and other rivers of India; it is also found in the rivers of Queensland, and freely enters brackish waters. It is a large species, attaining a length of 5 feet. It is called Cockup in Calcutta, where it is much esteemed as food. The air-bladder furnishes a small quantity of isinglass. *Lates colonorum*, a smaller species, is found in Australia.

Lates differs from the genus *Perca* chiefly in having only seven or eight spines to the first dorsal fin, and in the presence of pseudobranchiæ. The body is covered with scales of moderate size.

LA'TEX, LATICIFEROUS VESSELS. The white milky juice with which we are so well acquainted in our native spurge, the coladine, and the lettuce in flower, is known to botanists as *latex*. This juice flows through these plants in long branching tubes (laticiferous vessels), which are generally associated with the bast, and therefore in woody plants lie outside the wood and the cambium or formative layer. Latex is found in many plants belonging to several orders, but chiefly in the Apocynaceæ, the Euphorbiaceæ (spurges), and the Urticaceæ (nettles). The colour is usually white (or colourless), but occasionally yellow, red, and even blue. The juice is somewhat thickened, but the composition varies with the plant. It always contains more or less caoutchouc in the form of small globules, which give it the milky appearance, and can be separated just as the globules of butter can be separated from milk to form cream and butter. The principal sources of INDIA-RUBBER have been noticed under that heading.

Latex is generally poisonous, as in the deadly MANCHINEEL and the bitter CASSAVA, but the poisonous principle is got rid of in the starch extracted from the root of cassava by pouring off the fluid when the starch has settled, and then washing and heating the residue, so as to make tapioca. The sweet milk of *Euphorbia balsamifera*, on the contrary, forms a thick jelly, which is considered a great delicacy by the inhabitants of the Canaries. Similarly innocuous is the milk of the *Ilya-ilya* (*Tabernaemontana utilis*) of British Guiana, belonging to the Apocynaceæ; it forms a pleasant and refreshing drink. On the other hand the deadly Wourari poison, with which the South American Indians anoint their arrows, is the product of other members of the same family of plants. Several of the Urticaceæ supply caoutchouc; one, the cow-tree of South America (*Brosimum Galactodendron*), supplies sufficient milk from a single incision to satisfy the hunger and thirst of several individuals.

LATHE. See TURNING.

LATHE (anciently *lath*), a part or division of a county, containing three or four hundreds or wapentakes, according to the laws of Edward the Confessor, as in the counties of Kent and Sussex. *Lathree*, in Early English times, was the name of an officer who had authority over part of the county, according to the number of lathes he governed.

LATHS. In building operations two kinds of laths are in common use. *Slater's laths* are cut out of sawn plank, and nailed on to the framework of the roof, for the purpose of receiving the slates or tiles, which are fastened to the laths by nails. *Plasterer's laths* are made by splitting wood, principally Norway spruce fir, in the direction of the grain of the wood. They vary from $\frac{1}{4}$ to $\frac{1}{2}$ an inch in thickness, and are about 3 or 4 feet long. They are nailed upon joists for ceilings, and to the uprights of partition walls, in such manner as to leave a small interval between each lath, into which the plaster may be forced, so as to form a key to support the rest of the work. Upon the Continent oak laths are almost exclusively used.

LATIMER, HUGH, one of the most distinguished of the English reformers, was born at Thurcaston, in Leicestershire, somewhere about the year 1490. He was the son of a yeoman in comfortable circumstances, and at the age of fourteen he was sent to Cambridge, where he proved a diligent and able student. He graduated B.A. in 1510, and M.A. in 1514, having taken holy orders previous to the latter date. At this period he was a zealous adherent of the old forms of the church, or as he afterwards expressed it, "as obstinate a papist as any in England." On taking his degree of bachelor in divinity, he lectured against Melancthon and his opinions, and it was this sermon which induced Bilney to visit him, and ask him "for God's sake to hear his confession," the hearing of which caused Latimer to study the new teaching in a totally different spirit. After a time Latimer began to advocate the reformed doctrines in sermons of such power as to exercise a wonderful influence upon learned and unlearned alike. His activity soon became so obnoxious to the clerical adherents of the old doctrine that complaint was made to the Bishop of Ely, who prohibited him from preaching within that diocese, and when Latimer overcame this obstacle by gaining the use of a pulpit in the Augustinian monastery, which enjoyed exemption from episcopal jurisdiction, his enemies caused him to be summoned before Wolsey. The latter, however, after a conference with him, was so pleased with his evident zeal for the reform of prevailing abuses that he gave him special license to preach throughout England. Shortly after this he preached his two remarkable sermons "On the Cards," which excited considerable controversy at the university, and drove his enemies to a renewal of hostilities. But Latimer had expressed himself on the side of the king, who wanted to obtain a dissolution of his marriage with Catharine of Aragon. This

secured him the royal favour and protection, and in 1530 he was invited to preach before the king. Soon after, he was made one of the royal chaplains, and in 1531 he received also from the king the living of West Kingston, in Wiltshire. His reforming activity in this parish, as formerly in the university, raised up a host of enemies against him, and so exasperated Stokesley, the bishop of the diocese, that he caused Latimer to be summoned before Convocation, where, having refused to sign certain articles, he was excommunicated and imprisoned. Ultimately he made some retractions the exact force of which has been disputed, and he then obtained release and the reversal of the sentence. On the accession of Cranmer to the primacy in 1533 his position was completely altered, and he obtained a special license to preach throughout the province of Canterbury. In 1534 Henry formally repudiated the authority of the Pope, and Latimer took an active part in connection with Cranmer and Thomas Cromwell in the passing of such legislative measures as served to make the repudiation irrevocable. In 1535 Latimer was made bishop of Worcester, and he continued in his bishopric, labouring to secure such reforms as he felt to be urgently required, until 1539, when the king having given himself to the side of the reaction headed by Gardiner and Bonner, Latimer resigned his see and retired into private life. He was soon sought out, however, and as he refused to assent to the Act of the Six Articles, he was committed to the Tower, where he remained a prisoner for six years. On the death of Henry and the accession of Edward VI., he was restored to liberty, and again and more vigorously than ever resumed his preaching. His sermons during the whole of the reign of Edward were among the chief impulses of the Reformation, which then rapidly advanced. He was invited to return to his see, and the invitation was strengthened by the special request of the Commons, but satisfied with his work as a preacher he declined the honour. On the death of Edward and the accession of Mary, a summons was sent to Latimer to appear before the council at Westminster. He might have secured his safety by flight, as many others had done, and he knew beforehand what the result of his trial would be, for as he passed through Smithfield he observed, "This place has long groaned for me," but with cheerful readiness he obeyed the summons, and presented himself before his accusers. He was imprisoned, first at the Tower and then at Oxford along with Cranmer and Ridley, and after several delays he was tried and condemned to the stake. Foxe gives a touching account of his appearance before his persecutors, and describes him as "wearing an old threadbare Bristol frieze gown, girded to his body with a penny leather girdle, his Testament suspended from his girdle by a leather sling, and his spectacles, without a case, hung from his neck upon his breast." On the 16th October, 1555, he was brought out along with Ridley to a spot opposite Balliol College, to be burned to death. Never did a martyr meet his fate with a more serene and cheerful courage or a sublimer confidence in the victory of his cause. "Be of good comfort, Master Ridley," was his greeting to his companion, "and play the man; we shall this day light such a candle, by God's grace, in England as I trust shall never be put out."

The character of Latimer excites admiration by its combination of honesty, simplicity, earnestness, and heroism. In all things—in his sermons, in his reforms, in his character—he was eminently practical. By his preaching he exercised an immense influence over the progress of the Reformation, and his sermons are rare specimens of vigorous eloquence, which read fresh and vivid and powerful now after the lapse of three centuries. The homely vigour of his style, his keen wit and genuine humour, the unsparing invective with which he lashes the vices of his time, all combine to give his utterances a unique position

in sermon literature. Their allusions to contemporary manners and customs make them of immense value to the student of history, and they are not less remarkable for their clear and pointed statements of Christian doctrine, and the faithfulness with which they exhibit the simple ideal of the Christian life, in contrast to all hypocrisies and pretensions of religion.

A complete edition of the works of Latimer, edited for the Parker Society by the Rev. G. E. Carie, appeared in two vols. in 1844–45. (See also "Latimer," a biography by Demans, 1869.)

LATIN LANGUAGE AND LITERATURE. A little consideration cannot fail to convince anyone who knows both Latin and Greek that they are very closely allied. The great verbs *I am* (Gr. *eimi*, Lat. *sum*). *I know* (Gr. *gi-gnoskō*, Lat. *noceo*), &c.; the chief nouns *god, father, house*, &c. (Gr. *theos, patrēr, domos*, Lat. *deus, pater, domus*); the numerals *one, two, three*, &c. (Gr. *eis, genitive m-onos, duō, tria*, Lat. *unus, duo, tres*), and, in fact, the bulk of ordinary words, are common to the two languages. There can be no doubt whatever that either both came from one source or that one came from the other. Now, in many things Latin is more worn down; that is, has preserved less of its primitive inflexions, word-endings, case-endings, and the like, than the Greek, and we can therefore say that it is presumably a younger language, in the sense that it came later to the literary stage: for when languages are written, if the writings are of value in themselves and are widely known, they tend to crystallize: it is only while they pass from mouth to mouth that they wear and alter so considerably. We know, in fact, historically, that Greek was a language with a highly-polished literature before the Romans had emerged from a half-barbarian condition, or at least from such a condition as regards their attitude towards letters. Are we, then, to say that Latin comes from Greek? By no means. For the Sanskrit, an older language than either of them, with a literature of fabulous antiquity, shows us many of its archaic features preserved in Latin and lost in Greek: and therefore, as far as these are concerned, Greek is the more worn, and therefore the younger tongue. The conclusion is obvious. There was a great Aryan wave of immigration into Europe, hitting the continent in the centre and then dividing, one stream taking the Greek, the other the Italian peninsula. The two languages are of the same age in their origin, but Greek, coming to the literary stage first, preserved the older type of grammar, as shown in the dual (plural of two), the middle voice (what one does to one's self, the "reflective" view of the verb), and so on; while, at the same time, some archaisms worn out in Greece still survived in Italy when men began to write Latin, and were thus preserved.

There is, on the other hand, a considerable part of Latin which has no resemblance to Greek. This we attribute to the ancient Iapygian language, a tongue which we dimly see to have been spoken by the people whom the Greek-Latin invasion of Italy disturbed. It remains in a few unintelligible inscriptions which just show as much by their construction as that it has certain Aryan peculiarities, and no more. It is only found in the south of the peninsula, and the supposition seems feasible that the Iapygians were an earlier wave of Aryan conquest, driven before the subsequent wave of conquering Græco-Latins down to the rocky regions of Calabria and Apulia. This also accounts for the readiness of these parts to become Hellenized. All this region of southernmost Italy came to be called *Magna Græcia*, and held a Greek-speaking, Greek-living people, not a Latin.

Besides the Aryan Iapygians, we find in Italy the Etruscan people, dwelling in what is modern Tuscany, whose language—which we have in fairly numerous inscriptions—is in great part undecipherable, and regarding which

scholars as yet cannot fix any certain relationship. Many Aryan elements apparently exist, but then these might be gathered from the Italian tongues. In fact, all is dark as to the Etruscans, in spite of ample tomb-remains, inscriptions, sculpture, and historical records.

Between these Etruscans and Iapygians lay what we may call the Italian peoples therefore—the Italian half of the great wave of Aryan conquest. And these soon split into an eastern (and southern) division, speaking Oscan Latin, and a western division, speaking Latin proper. Among the Latin peoples Rome arose, and in proportion as she gained supremacy so the Latin dialect rose also, overpowering the kindred Oscan, then the strange—perhaps non-Aryan—Etruscan, then the Greek, which had in the south replaced the Iapygian; but doubtless in country places these older dialects and languages remained till very late times; and, in fact, we know absolutely that they did so.

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Obli't' sunt Romal' lo'qui . . . cr' Latina lin'gua."

(If the immortals permitted themselves to weep for mortals, the muses would weep for the poet Nævius; for at Rome they have forgotten to speak Latin.) But Nævius and his Saturnian verse were doomed. Contemporary with him lived Quintus Ennius, a Calabrian, Latin by birth, Greek by education. He was born 238 B.C., settled in Sardinia, was brought to Rome 204 B.C. by the great Cato the Censor, and began to write a little before Nævius was leaving off. He taught Greek many years to the fashionable young nobles of Rome. Accomplished in the forms of Greek literature he gained consummate power over the

now finished Latin language, and his life-task during a long career (he lived till seventy years of age) was the training of the younger language to walk in the train-marks of the older literature. His success was absolute. He, one man, created models for all time. He is known to us by his vast reputation better than by the fragments which lie scattered up and down Latin literature; still enough remains to show his real greatness. Cato himself wrote on agriculture ("De Re Rustica"), but the treatise, in the form in which we have it, has been so modernized as to be of little value. The historians (Q. Fabius Pictor and L. Cincius Alimentus) of the great war with Hannibal wrote in Greek itself, now rapidly becoming the fashionable language of culture, much as French in our day is studied by all nations as the common medium of cultured talk. Ennius, however, always kept to Latin. Many of his happiest lines were borrowed by Virgil; half a dozen such plagiarisms may readily be pointed out. Ennius' fame rested upon a great epic in eighteen books, entitled the "Annals of Rome," the first six books dealing with the legends and early history, the remainder with the Punic Wars. He boasts himself that "he first abandoned the rude metre of Fauns and Bards" (Saturnian metre) and studied elegance; and all later writers, Lucretius at their head, admit that he formed the language and literature. He did the same office for Latin that Shakspeare and King James's Bible (the Authorized Version) have done for English. Seneca, writing in the time of Nero, two and a half centuries later, calls the Romans the "people of Ennius" (*populus Ennianus*), just as we are styled the nation of Shakspeare; and portions of the great epic (now lost except in quotations) were recited down to the time of the great and good Emperor Marcus Aurelius, who reigned from 161 to 180 A.D.

Ennius also wrote tragedies, and these too were much esteemed. But the strength of Roman drama lay in the other branch. The comedies of Plautus (born 254 B.C., died 184 B.C.) and of Terence (195-161 B.C.) are still able to delight and amuse us. T. Maccius Plautus was an Umbrian, native of Sarsina, son of a freedman, a jolly, tavern-haunting, careless fellow, whose comedies, free imitations of the Greek, but full of native humour and raucous freshness, run upon older Greek types of well-worn characteristics, like the personages of Molière (who indeed inherited them from Plautus), and depend for their success upon the handling, not upon the originality, of the story. We pardon Plautus his occasional coarseness for the glimpses of the older Roman life he gives us, and for his broad fun. We find touches not unworthy a Falstaff in his "parasite" in the "Miles Gloriosus," with the "hundred Cryptolathronians (Plautus revels in comically long words), the thirty Sardians, and sixty Macedonians" whom he alleges his patron to have killed in one battle. "What's the total?" says Pyrgopolinices; "Seven thousand, my lord," quick replies the unblushing one. We have luckily twenty comedies left to us of Plautus.

Publius Terentius Afer (whom we call Terence) was an African (Afer) of Carthaginian extraction, taken into slavery by the Roman P. Terentius, whose name, according to universal custom, he adopted on obtaining his freedom. He won the friendship of Lælius and of Scipio Æmilianus, who were then studying Greek under Polybius, and who helped him both in his translations from the Greek models he used, and in polishing the Latin. We have six comedies of Terence. As he died at thirty-four perhaps they are all he wrote. They are perfect gems, polished to the utmost refinement. We enjoy Plautus, we only admire Terence; as Cæsar very truly said, the latter was but "half a Menander," i.e. was deficient in comic vigour, for the ready burst of wit was refined away in the pursuit of elegance of diction. Another pair of comic dramatists of about this time are Q. Cæcilius of Milan (also a slave) and L. Afranius,

but nothing save their reputation has survived to us. We know them well by name, and no more. The same as to the tragedian Attius or Accius (170-94), of whom we are provokingly told on all sides that he was the greatest Roman tragic author, and yet we have scarcely a line of him. Satire began to emerge from the rude license of the Fescennine verses in the hands of C. Lucilius, who enjoyed in his day a vast reputation. He died B.C. 103 at Naples. We have just enough to show that his fame was deserved. Indeed Horace, as the Satires show, was jealous of the fame his works still enjoyed a century after their appearance. Finally, in this first period began the great orators whom the civil wars, now to begin the downfall of republican Rome, trained to the highest perfection. The Gracchi, Antonius, Crassus, Sulpicius, are heroes of the forum, swaying a mighty nation by the force of their persuasive words. Their great orations were most carefully prepared, even to the point of pitching the voice to the tone-surge told softly by a flute player stationed near.

Golden Age—the Republicans.—At the opening of the golden age of Latin literature, the close of the Republic and the dawn of the Empire, covering the last century before our era and a little beyond, we arrive at the great orator Hortensius, champion of the nobles, and the greater Cicero (106-44 B.C.), who was champion of whatever paid best at the time. Cicero's style is so perfect that it is rightly taken as the type of Latin prose. No writer approaches him for elegance. We feel that it is mere declamation for the most part, but the language is so exquisitely choice that we are bound to admire. Probably, however, most readers find greater pleasure in the terse and concentrated energy of Caius Sallustius Crispus (Sallust), whose two histories, of the Catilinarian Conspiracy and the Jugurthine War, are masterpieces which have delighted every generation since their production. We all admit that they are quite inaccurate, as full of partisanship of the democracy, the Whigs of the time, as anything of Macaulay's in our day, but we cannot choose but enjoy them the more at every fresh reading. After the flowing longwindedness of Cicero the close crisp sentences of Sallust rush through the mind like a freshening breeze. We may almost think that had Sallust not written Tacitus might have been different. Sallust lived from 86 to 35 B.C. Numbers of other historians, whose names we need not here recount, sprang up in Sallust's train. The only other one of world-wide fame is the great Caius Julius Cæsar himself. Cæsar's Commentaries, especially the "Gaul," are among the most fascinating of all books ever written. The very schoolboys who painfully toil along, dictionary in hand, burn with ardour as the "tenth legion" does something grand, or the great commander performs some feat of extra audacity. The language too is beautifully polished, and yet almost unequalled for its straightforward simplicity and delicate appropriateness to its martial purpose. This is no parade warfare that we are told of, but hard fighting with a barbarian foe.

Now began the grammarians to find a field for their labours; and the chief writer in this department at the close of the republic was Varro, M. Terentius Varro of Reate (born 116 B.C., died 28 B.C., aged eighty-eight), of whose twenty-four books on the Latin language six now remain, monuments at once of the infancy of philology and of the indomitable industry of the man. We also have from him a complete account of the agriculture of the period, in three books. He was a Pompeian in politics; but Cæsar, in his large-hearted way, did not let that stand as an obstacle to his cordial support of Varro's idea of a great public library at Rome. Varro is proverbially known as the most learned of the Romans.

From Lucilius to the Augustans only two poets of real note occur, but they were truly great men. Titus Lucretius Carus, usually called Lucretius (99-55 B.C.), has left us a magnificent poem on "Nature," the flower of the

Epurean philosophy, exquisite from every point of view, bursting every here and there into passages of the noblest poetry imaginable: witness the prelude of Mars and Venus, and the sacrifice of Iphigenia. He was little appreciated in his own time, perhaps because of his indignant scorn for the gross polytheistic worship of the time. Virgil loved him, and stole from him considerably. Many competent critics place Lucretius at the head of all Roman poets. He died in a fit of melancholia, to which he was distressingly subject. The other great poet of this time is Catullus. Quintus Valerius Catullus was born at Verona, 97 B.C., and was still living in 47 B.C., but the date of his death is not known. His father was a friend of the great Caesar, and left his son that house on the shore of Benacus which lovers of Catullus know so well from his poems. He shines in short occasional lyrics, but he can touch a noble string if occasion need; and Horace never wrote anything so touching as the "Elegy to Hortalus," nor so full of true poetic fire as the "Atys," a fine dithyrambic poem. Catullus, unhappily, is occasionally grossly impure.

A curious sort of comic, or rather farcical, poetry reigned supreme just at this period in the favour of the Roman people. This was the *mime*, a comic prose dialogue, full of pungent hits at topics of the day. Laberius, a Roman knight (*eques*), was the best author of them, and his rival was a freed slave named Syrus. Syrus acted in his own mimes, and Caesar therefore commanded Laberius not to act in his mimes—a terrible degradation to one of the Roman aristocracy. Laberius had to obey, but we have still the passages of the fiery prologue in which he struck at the powerful Dictator who had injured his fame.

"Necesse est multos timeat quem multi timent"

(He who must fear many whom so many fear), is one of his thrusts. The pathetic line, "I have lived one day too long," is another fine point.

Golden Age—the Augustans.—The universal acquaintance with the splendid epic of Virgil, Publius Vergilius Maro (70–19 B.C.), the "Enoid," with his *Bucolics* and his *Georgics*, forces us from treating of him in this place. His elaboration of phrase and epithet, his vast learning, his tender grace, are qualities which everyone knows and admires. His friend and brother poet Horace, Quintus Horatius Flaccus (65–8 B.C.), only a few years younger than Virgil, shared his love of Greek metres and fancies, his unspurning elaboration and polish, but far excelled him in ease and naturalness. Horace poses as the man of the world, good-natured, taking life on its bright side, but always ready with a cynical wit, pungent without ever degenerating into ill-nature. Who does not know his incomparable lyrics? Both of these great men were friends of Augustus, and still more of Mæcenas, the emperor's close friend and the magnificent patron of literature. Directly in contrast with the exquisite clearness of Horace stand the obscure poems of Propertius, an undoubted genius, but so intensely original and mannered as to seem hardly a Latin writer at all. His idioms are largely Greek, his words purposely archaic. A few poems of Tibullus (55–18 B.C.) make us long for more; few as they are, they have earned their writer lasting fame. With Ovid (43 B.C., died 18 A.D.) we are more fortunate. Publius Ovidius Naso was born at the Sabine town of Sulmo in Central Italy, of a noble family though not wealthy. He was brought up to the bar, but could never keep away from poetry. Eventually he got to Athens, where he became accomplished in Greek scholarship. At Rome, on his return, he was fairly fortunate, receiving several small state appointments, and moving in the best society. The Corinna whom his poems ("Amores") never weary of celebrating, is thought to be the dissolute Julia, daughter of Augustus. At all events he deeply offended the emperor in some manner. Julia was banished for her

ill conduct, and afterwards Ovid was sent into banishment to Tauri in Thrace, where he died at sixty, in the year 18 of our era. To console himself in his exile he wrote his "Fasti." His "Loves," his "Art of Love" (the pretext for Augustus's banishing edict), and his most important and highly finished work the "Metamorphoses," had all previously been written at Rome. The latter work is a collection of those legends of transformation which abound in Greek and Latin mythology, from the creation of the world, as the pagans held it, to the conversion of the soul of Divus Caesar into a star. The "Tristia," or Lamentations, was a later work of his exile. He never ceased to bewail his fate, wretched with cold and solitude and the perils of barbarians. As a writer Ovid is "full of conceits," his restless fancy and great facility of composition give his works a cold glitter which mars them. Nevertheless he is distinctly one of the greatest of the Romans.

The last of the Augustans is among the best of the splendid group. It is the historian Livy, whose style is so singularly varied and beautiful that it may be taken as the crowning point of the language. Never afterwards was such fine Latin prose written. Titus Livius Patavinus (i.e. the Paduan) was born at Padua in B.C. 59, lived at Rome, and returned to his native town to die in the year 18 of our era. He therefore lived seventy-seven years. As Quintilian says of him, "His felicity of expression is admirable, and his rich style flows like milk." His great work is of course the well-known "History of Rome," which gained him the friendship of Augustus, Tiberius, and Claudius, the Caesars, who all were, or were afterwards to be, emperors. This magnificent work was in 142 books, extending from the foundation of the city (753 B.C.) to the death of Drusus (A.D. 9). We have thirty-five books entire, and fortunately there are epitomes of most of the remainder. In Livy the heroes live; the distinctness of outline and warmth of colouring are admirable; he is interesting as a romance. Ages of critics at work upon the text have discovered in him a want of erudition, a disposition not to sift authorities nor investigate ancient primary sources of evidence; but few would have Livy other than he is. Next to Caesar, he is probably the best known and best loved Latin prose author.

The Empire—Silver Age.—The despotism of Tiberius and his successors crushed Latin literature; Velleius (died 31 A.D.), the elder Seneca (died 30 A.D.), represent the time. Persius, Petronius, Lucan, and the younger Seneca, all of them dying about the year 65 of our era, mark the pseudo-classical age of Nero—an age of imitation and false literary glitter.

The Plinys are the next names of note. The elder Pliny, Caius Plinius Secundus (23–79), author of the well-known "Natural History," is also famous as having perished by his scientific ardour leading him to approach, for purposes of observation, too close to the burning Vesuvius during the great eruption of 79. He was a native of Como, rose to distinction under Nero, and became the intimate friend of Vespasian. His diligence in study was enormous. He rose before light to wait on the emperor, and after state business was over, would study, write the whole day, or read, making copious extracts, spending a brief time at a simple meal, and working far into the night. Even in the bath he listened to reading or dictated. He wrote several large works, but the only one left is the "Natural History," which he says "holds 20,000 matters of importance, culled from 2000 books." His style is very stilted and artificial, and the work of a reader and compiler must of course be inaccurate, but the world could ill spare the gossip of the learned Pliny, and on several interesting points of antiquity he is our sole informant. The younger Pliny, his nephew, Caius Plinius Cæcilius Secundus (61–113), was the son of his uncle's sister, by C. Cæcilius, and having lost his father was adopted by the elder Pliny, and took his name. He was a great friend of the famous Tacitus, and both of them

had the reputation of being very learned. His "Panegyric" on the Emperor Trajan, whose friend he was, is rather fulsome; the ten books of Letters (*Epistolæ*) are far more valuable. Pliny the younger collected them himself, as our own Pope did in like circumstances; for he had become famous as a letter writer. One of the letters describes his uncle's death at Vesuvius. Another mentions the Christians, some of whom he had put to the torture to get at the truth of their "superstition," but he could elicit nothing worthy of punishment. He therefore consults the emperor. The passage is deeply interesting, and quite honourable both to Pliny and Trajan, from the Roman point of view. His style is a great improvement upon that of his uncle: a return to purer models. This was largely due to the great grammarian and teacher, Quintilian. Marcus Fabius Quintilianus (40-118) never failed to extol the writers of the golden age, and to strive against the tawdry rhetoric prevalent in his own. His treatise, "Institutiones Oratoriae" (Principles of Oratory), is most valuable. It was written in the reign of Domitian, to some of the younger members of whose family he was preceptor, and incidentally throws a flood of light upon the life and manners of the period. The tenth book gives a spirited history of Greek and Latin literature. The epic poets of this time are not of great value. They are C. Valerius Flaccus (living under Vespasian), author of the "Argonautæ;" Caius Silius Italicus (25-100), who wrote the dull, heavy "Panic Wars," a mere turning of Livy and Polybius into verse; and Publius Papinius Statius (61-96), whose "Thebaid," relating the expedition of the "Seven against Thebes," is not without merit. We also have part of an "Achilleid," and some pleasing occasional poems called *Silvæ*. But this time is lifted from its reproach by two splendid authors, whose glory forms the sunset of Latin literature. These are Juvenal and Tacitus.

Decimus Junius Juvenalis (47-138) we know little of, except through his works. These are sixteen highly-elaborate satires, lashing the vices and follies of Rome in imperishable lines. His language is the language of Virgil, but his style is rhetorical, and of immense power; in some passages every word is a stab, every line an epigram, glowing with indignation, full of splendid sounding phrases, yet concise and pithy beyond parallel. Such a result is due to years of unwearied labour. These sixteen poems represent a life's hard work. In their style they are unequalled. Johnson and Swift have attempted parallels to them in English, with great success.

Finally, Caius Cornelius Tacitus (60-118), greatest of historians, carries the brevity of Juvenal, the colour, the rhetoric, and the fierce indignation to still higher limits. We know the personages of his history better than those of our time. By his pen's verdict they are to us praiseworthy or blamable. He was befriended by Vespasian, and continued in favour with his sons, Titus and Domitian. He married a daughter of the great Agricola, the illustrious governor of Britain. Fortunately we have the "Life of Agricola" by Tacitus, written just after Trajan's accession, A.D. 98, acknowledged to be the model of a biography. The famous History was written after the death of Nerva (98), and extended from Galba (68) to Domitian (96), and was to have had the reigns of Nerva and Trajan added. Of this very full account, judging by the scale of what is left to us, we have four books, covering the events of one year. The still more famous Annals run from the death of Augustus, A.D. 14, to the death of Nero, A.D. 68. All Caligula's reign, five years of Claudius, and the last two of Nero are lost. Many times have forgeries of the "lost books of Tacitus" been attempted to meet the eagerness of students for their discovery. Tacitus also has left us a valuable account of Germany as it was then known to the Romans. With many imperfections, its information as to the customs of these barbarian ancestors of ours is simply priceless.

Contemporary with Tacitus, but long outliving him, was another historian—Caius Suetonius Tranquillus (75-160)—whose "Lives of the Twelve Cæsars" covers much of the ground of Tacitus' Annals. He was very friendly with the Emperor Hadrian and with the younger Pliny, so that, scandalous as his history is, we are bound to believe it was in some sort founded on fact. As a writer Suetonius is clear, unaffected, and very readable; but the genius and philosophy of Tacitus is all too painfully absent. With him closes the long line of Latin classical authors.

By this time we may say, with a little exaggeration, classical Latin was almost as dead a tongue to those who wrote it as it is to ourselves. A great alteration in the language of the streets and houses of Rome had taken place; while the language of Cicero, Cæsar, and Livy remained the literary medium, the speech of the people had continued to develop. Indeed, as early as the second Punic War grave differences existed, and by the close of the Republic one might almost say there were two kinds of Latin, the patrician and the plebeian. So it went on until, at the close of the classical period with Juvenal and Tacitus, the living "speech of the camp" (*verbum castrense*), as it was called, succeeded in thrusting out the ornate and cultured tongue, except in books; that is, as a dead language. Each had its own grammatical forms and its own vocabulary. Thus to strike is *verberare* in Latin, but in popular Latin it is *batuere*. *Horse, wreck, battle* are in our dictionaries *equus, hebdomus, pugna*; but in the mouths of the people they were *caballus, septimanus, batualia*. We know this from the grammarians, who vehemently caution their pupils against using in their writings these low, vulgar expressions. Time has his revenges. The French *battre, cheval, semaine, bataille* preserve the vulgar Latin alive among us. Italian and Spanish do the like. Literary Latin has no descendants; except in manuscript and print, it is dead. Greek lives still in Modern Greek; Latin has no living children. But while Plautus, Terence, Lucretius, Sallust, Cicero, Cæsar, Virgil, Horace, Ovid, Livy, Catullus, Juvenal, and Tacitus exist on paper, this dead Latin has a deathless life, for she lives ever in the souls of men.

LATINI was the name of one of the oldest nations of Italy, who are said to have descended at some remote time, before the building of Rome, from the central Apennines, in the neighbourhood of Reate (the modern Rieti), into the lower country between the Anio, the Tiber, the Alban Mountains, and the sea, which was afterwards called Latium. These Latins appear to have formed their settlements in the lowlands, where they founded many towns—Laurentum, Lanuvium, Lavinium, Aricia, Gabil, Tusculum, Tibur, Praeneste, Labicum, Collatia, Cora, and others. That there was a mixture of Grecian blood in the Latin race seems not to be doubted, and a comparison of the Greek and Latin languages proves at least that those who used these tongues were sprung from or related to a common stock. The Latin communities were united by religious rites.

The Latini are described as a race robust, hardy, frugal, and warlike, and their early union with Rome, great part of whose population was recruited among them, contributed mainly to the growth and success of that republic. Their towns were strong, both by their position and their massive walls, traces of which still exist on the sites of ancient Praeneste, Tusculum, and other places of dates anterior to Rome. The foundation of Alba (*Alba Longa*) is involved in great obscurity, but the fact of its being an important town several centuries before the existence of Rome is undoubted.

Under Tullus Hostilius, the third Roman king, war broke out between Rome and Alba, which ended in the destruction of Alba and the removal of the inhabitants to Rome. In the following reign of Ancus Marcius, the first war of the Latins against Rome is mentioned: the result

was that Politorium, Tellene, and Ficana were taken by the Romans, and the inhabitants transferred to Rome, where they were settled on Mount Aventine. Servius Tullius obtained by agreement with the leaders of the Latin cities what his predecessors could not obtain by force, namely, that the Latins should unite with the Romans in building a temple to Diana on the Aventine, to be common to both people. This was considered as an acknowledgment that Rome was the head of the Latin nation. Tarquinius Superbus, the last of the Roman kings, persuaded the Latins not only to renew the treaty with Rome, but to acknowledge him as their princeps or chief, and to send their youth to serve no longer as auxiliaries, but mixed with the Romans in the same legion. The history of the Latin cities, after the expulsion of the last king to their subjugation by the Romans, B.C. 337, is a part of the history of Rome. Some of the Latin towns had previously obtained the Roman citizenship, either complete or in a limited degree.

The Latins remained for two centuries and a half in the same dependent condition, until the breaking out of the Social or Italian War. The tribune Livius Drusus proposed that the full Roman citizenship should be extended to them, as well as to the other nations of Italy which had formed treaties of alliance with Rome. Drusus, however, was murdered, and his motion was dropped for a time. But when the Marsi, Samnites, Peligni, Campanians, and Lucanians rose in arms, and constituted themselves into a confederation, of which they made Corfinium the capital, and after they had defeated several Roman armies, the consul L. Julius Cæsar (B.C. 91) advised and obtained the passing of a law which gave the Roman franchise to all the people of Italy who were allies of Rome and had remained faithful in that emergency. This franchise, or *civitas*, is stated accordingly to have been granted to the socii or allies, who had furnished their contingents, and to the Latins, who are mentioned distinctly from the rest. By this grant the freemen of the Latin towns were placed so far on a level with the Roman citizens as to enjoy the full Roman franchise, to be admitted into the Roman rustic tribes, have votes, and be eligible to public offices. Thus the distinction between the Romans and the real or original Latins was obliterated.

LATITUDE. See LONGITUDE AND LATITUDE.

LATIUM, the country of the ancient Latins, had at first for its boundaries on the west the Tiber, which divided it from Etruria; on the north, the Anio, which separated it from the Sabini; and on the south, the Tyrrhene Sea. To the east and south-east its boundaries on the side of the Volsci are not so clear. After the final conquest by Rome of the Volsci, the Hernici, and the Abruclii, the name of Latium was extended to the whole country inhabited by these three peoples, in addition to the country of the old Latins, and this was called Latium Novum. Under Augustus Latium and Campania constituted the first of the eleven regions into which Italy was divided by that emperor.

The regions of Latium and the greater part of Latium Novum are now comprised in the district of CAMPANIA in Rome.

LATOONA. See LITO.

LATOOKA, a country of East Africa, lying between the Red Sea and Chol, which was first made known to Europeans by Sir Samuel Baker. It is in 49° 25' N. lat., and 32° 19' E. lon., but its exact limits are not well defined. It chiefly consists, however, of a valley 40 miles long by 18 wide, and diversified by woods, thick jungles, and open park. The inhabitants are tall, muscular, and well-proportioned, have good foreheads and a pleasing countenance, and are altogether superior to most other tribes near the White Nile. The men are entirely naked, and the women nearly so; the former grow their hair in

such an extraordinary fashion that it serves the purpose of a helmet, but it takes from eight to ten years to bring it to the right size and shape. The Latookas are a warlike race, and are well armed, their principal weapons consisting of a lance, an iron-headed mace or club, a long-bladed knife or sword, and an iron braceret. They are unusually rich in cattle, which is the chief wealth of the country. From 10,000 to 12,000 head are housed in every large town.

LATREILLE, PIERRE ANDRÉ, a distinguished French entomologist, was born in humble circumstances at Brives-la-Gaillarde, 29th November, 1762. When quite young his abilities attracted the attention of the Baron d'Espagnac, who placed him in the college of Cardinal Lemoine to be educated for the church. In 1786 he was ordained priest, and in the same year retired to Brives, where for two years he devoted all his leisure to the study of insects. Returning to Paris in 1788 he formed the acquaintance of the leading naturalists there, and in 1791 he communicated a paper on the hymenopterous insects of France to the Natural History Society of Paris, which procured him the title of corresponding member of that society as well as of the Linnean Society of London. On the breaking out of the Revolution, being a priest, he became involved in its persecutions, and was sent a prisoner to Bordeaux, and sentenced to be transported to Cayenne. While in the prison, its physician observed him attentively examining a spider, and getting into conversation was so impressed with his ability that he spoke of him to two naturalists of Bordeaux, Bory St. Vincent and D'Argelas, who intervened and succeeded in procuring his liberty. He returned to Paris in 1798, and obtained employment at the Jardin des Plantes. When Lamarck became blind, Latreille was named assistant professor, and continued Lamarck's lectures on the vertebrata till his death in 1829. Latreille was then appointed professor of zoology (of crustaceans, arachnids, and insects); but being then sixty-seven years old, he remarked, "On me donne du pain, quand je n'ai plus de dents." He died in Paris, 6th February, 1833. He was the author of several valuable works, but his greatest are the "Genera Crustaceorum et Insectorum," and that portion of Cuvier's "Règne Animal" which contains the "Insects and Crustacea."

LAUD, WILLIAM, Archbishop of Canterbury, was the son of a clothier at Reading, where he was born 7th October, 1573. From the free school of his native town he passed, in 1589, to St. John's College, Oxford, where he became first a scholar; then, in 1593, a fellow; somewhat later a reader in grammar; and after he had taken orders, a lecturer in theology. As early as 1601 he revealed his divergence from the theological and ecclesiastical principles which had prevailed in the Church of England since the Reformation, by declaring in one of his lectures that the Church of Rome had previous to that event been the true visible church of Christ on earth; and in the theses which he defended in 1604 for the degree of bachelor in divinity, he maintained against the Puritans the necessity of baptism as the vehicle of regeneration, and the necessity of the episcopate to the existence of a true church. These views excited great opposition in Oxford, and even drew upon him a formal censure from the university, which was then presided over by George Abbot, afterwards archbishop of Canterbury. In 1608 he was made D.D., and became chaplain to Dr. Neile, bishop of Rochester, who not only gave him several parochial benefices in succession, but introduced him to the king. James I. had now, from a professed Presbyterian and contemner of the English liturgy, which he had once spoken of to his Scottish subjects as an ill-said mass, become a high Anglican churchman, and Laud was a theologian entirely to his mind. He rose rapidly in royal favour, and though for several years his influence at court

was powerfully counteracted by Archbishop Abbot and Lord Chancellor Ellesmere, this did not hinder his being made, in 1611, a royal chaplain, and in 1616 dean of Gloucester. Nor was Ellesmere, as chancellor of Oxford, more successful in preventing his elevation in the university, for in 1611 he was elected president of St. John's. On his return from Scotland, which he visited in attendance on the king, he was made a prebendary of Westminster, and in 1621 bishop of St. David's. It was now that he began to give full scope to his favourite views. His Visitation Articles of 1622 were a declaration of war against Puritanism, and enforced the restoration in his diocese of all church decorations and arrangements anciently in use, which had not been expressly abolished by ordinance since the Reformation. Pictures, candelabra, rich altar hangings, and painted windows were again to be seen in the churches of South Wales; the communion table was turned into an altar; and the altar was separated by a screen from the less holy parts of the church. It was evident to the nation that the church was now to be deprotestantized both in doctrine and worship, and that much of the work of King Edward's and Queen Elizabeth's divines was to be undone.

On the accession of Charles I., in March, 1625, it soon became evident that Laud was even a greater favourite with the new monarch than he had been with the old. He was chosen to officiate at the coronation in preference to Bishop Williams of Lincoln, whose puritanical tendencies had brought him into disfavour; and soon after he was promoted to the see of Bath and Wells, and made dean of the chapel royal and a member of the privy council. When Archbishop Abbot was suspended from his functions Laud was one of five bishops intrusted with the administration of the primacy; he became the soul of the commission, and as such virtual primate of the realm. Soon after, in July, 1628, he was elected to the see of London. After the assassination of Buckingham he became more indispensable than ever to the king; and along with Wentworth, earl of Strafford, of whose policy of "thorough" he fully approved, he became the king's chief instrument in his fatal attempt to set up and establish an absolutism both in church and state. In May, 1633, he accompanied Charles to Scotland, where he would have introduced at once the English liturgy and order if he had not been overruled by the Scottish bishops, who, understanding better than he the feeling of the nation, advised that it would be safer to impose upon Scotland a service-book that might in some sense be called her own than the prayer-book, however excellent, of her "and enemies of England." But his resolute will made itself felt in the composition of this new liturgy; if the book must be less English, it should also be less Protestant: the consecration prayer in the communion service was brought as near as possible to the Roman formula; benedictions for the dead and other suspicious features were also introduced; and blinded by the infatuation which has so often been the ruin of despotism, Laud and his misguided master never doubted that they should be able either to corrupt or to coerce the conscience of a whole nation, which, since the days of Knox, had never abated one jot in its hatred and abhorrence of everything connected with Roman Catholicism. Soon after his return from Scotland, on the 4th August, 1633, Laud was made archbishop of Canterbury, and on the same day, it is said, he had the offer of a cardinal's hat. He declined to become a prince of the Church of Rome, but the form of his declination was mild indeed. "He felt something in him which said no, so long as Rome was not otherwise than she was." For some years he continued at the height of ecclesiastical power, and did his utmost to repress the free spirit of Puritanism, exciting against himself an amount of hatred which eventually wrought his ruin. Nor is this to be wondered at, for his

fierce intolerance made him altogether indifferent either to justice or compassion, and in addition there may have been some cruelty and malice in his disposition. There can be no question as to his zeal for the church, but he was not compelled to enforce its claims by means of fines and imprisonments, slitting of nostrils, cropping of ears, the branding iron and the pillory. When the Long Parliament assembled in 1640, it was evident to observers that his life was doomed. On the 1st of March, 1641, he was thrown into the Tower, and there he lay for three years before his cause came to a public hearing. On the 12th of March, 1644, proceedings began in the House of Lords, but it was not till 2nd January, 1645, that sentence was finally given against him. On the 10th of the same month he was beheaded on Tower Hill, and he died with a composure and dignity becoming his character as a Christian bishop. His body was removed in 1663 to St. John's College, Oxford. His dying words, to the effect that only his zeal for the church had brought him to the scaffold, need not be denied. But his zeal for the church had been intemperate and fanatical. It had made him a willing instrument of royal despotism, and a chief agent in trampling upon the rights and liberties of the kingdom. It had narrowed his understanding and poisoned his heart. Independent of this he was a liberal patron of learning and scholars. He was a great benefactor of the University of Oxford; and the sumptuous buildings which he erected there, the Arabic chair which he founded, and the numerous valuable manuscripts which he presented to the Bodleian Library, still remain to attest his enlightened and munificent concern for the interests of education and letters. His diary was published by Wharton in 1694, and his works were issued at Oxford during 1857-60. (See also Hook's "Archbishops of Canterbury," vol. xi., London, 1875.)

LAUDANUM. See OPIUM.

LAUDER, a royal burgh of Scotland and the capital of the district of Lauderdale, in the county of Berwick, is situated on the Leader, 25 miles S.W. of Edinburgh, and 378 miles from London. The town is plainly built, and has no edifice of any architectural pretension. It consists mainly of one long street, and has a town hall, a parish, a Free, and a United Presbyterian church, a Roman Catholic chapel, and a public reading-room and library. It is governed by two bailies and seven councillors. The charter dates from 1502. Twenty years before, Cochrane and other minions of James III. were hanged by order of the Earl of Arran and other noblemen over the parapet of a bridge near the town. In the vicinity is the castle of Thirlstane, a seat of the earls of Lauderdale. At Harefoulds, in Lauderdale, there is a curious old British settlement inclosing huts. Remains of a Roman way, and also of Roman camps, are traceable in several places near to it. The population of the parish in 1881 was 1940; of the town, 1014.

LAUDS (*Lauds*, i.e. Praise-), an office of the Roman Catholic Church; that one of the canonical hours which follows Matins. It consists of versicles and responses, followed by seven psalms and a canticle, a lesson, the hymn for the day, the Benedictus, collects, &c. The Matins of King Edward VI.'s English Church prayer-book combines the two offices of Matins and Lauds. Both offices are usually sung in the Roman Catholic Church "by anticipation" on the evening before the day which they should properly celebrate. By the rubric Matins should begin at midnight, and Lauds should follow it.

LAUENBURG, an ancient duchy on the Elbe, now constituting the southern part of the Prussian province of Schleswig-Holstein, with which it was incorporated 1st July, 1876. It has Mecklenburg and Holstein E. and W., the territory of Lubeck N., and the river Elbe S. On the eastern border are several lakes, the chief of

which are the Ratzeburg See and the Schaal See. The principal rivers are the Stocknitz and the Delvenau. The surface is generally flat, sandy in the centre, and marshy in the south. The capital town is Ratzeburg. The area is 455 English square miles, and the population 50,000. The little state, since its foundation in the thirteenth century, has been successively in the possession of Anhalt, Saxony, Sweden, Brunswick, France, Hanover, Denmark, and Prussia. It was ceded by Denmark to Austria and Prussia in 1864, and passed into the possession of the latter power in 1865, in consideration of a money payment to Austria. In 1870 it was finally incorporated with the rest of the Prussian monarchy.

LAUBURG, a town of the above district, but not the capital, is situated on the right bank of the Elbe, at the mouth of the Delvenau or Stocknitz Canal, 27 miles S.E. of Hamburg. It has a custom-house and a large transit trade.

LAUGHING GAS, or Protoxide of Nitrogen, is a transparent colourless gas, with a sweetish taste and smell; 100 cubic inches weigh about 47 grains, and its specific gravity is 1.527. It supports combustion of many bodies, and, like oxygen, when mixed with hydrogen it forms a mixture which explodes on the application of a flame. Its most remarkable property, however, is its intoxicating power on the animal system. When mixed with atmospheric air it produces, after a few respirations, total loss of control over the muscles of the mouth, and thus causes the person who has inhaled it to continually burst into uncontrollable laughter, from which circumstance the gas has derived its popular name. For many years, therefore, it was used almost solely for amusement; but in 1868 some most important results were arrived at with regard to it, which have invested it with a utility once little imagined, and have already rendered it a substitute for chloroform in dental and also in some minor surgical operations. From a series of most carefully conducted and elaborate experiments at the London Dental Hospital in the above year, it was found that if the gas is inhaled pure by aid of an appropriate mask, fitting closely over the mouth and nose, with valved openings for ingress and egress, and air thus excluded, the patient in a few seconds becomes totally insensible, slightly livid in the face, and breathes with a snoring noise. At this moment an operation may be commenced and continued for two or three minutes without pain or unpleasantness being experienced. The chief advantage attending this use of the pure gas is that within half a minute or minute the person operated on regains perfect consciousness, without any of the disagreeable effects which frequently follow the employment of chloroform. The main practical disadvantage is that its influence soon ceases, and recovery must be allowed before inhalation can be safely continued. Hence, at present, it is principally used in dental operations. In these cases great success has attended its administration by many of the most skillful London practitioners, and it is still more used in America. It is estimated that at least 60,000 gallons are now annually manufactured in London alone.

LAUGHING JACKASS. See JACKASS, LAUGHING. **LAUGHTER.** If a man is suddenly pleased and carried to the highest degree, he draws a swift breath and follows it by a series, sometimes a long-continued series, of short spasmodic expirations, often in strong paroxysms amounting almost to convulsions, and causing pain by their violence, so that the Miltonic phrase becomes true of

"Laughter holding both his sides."

During these rapid spasmodic expirations the glottis is freely open and the vocal chords vibrate with force, giving a well-known variety of sounds highly characteristic of each separate individual, from the *te-hee* of a tittering school-

girl to the *ha-ha* of ordinary manhood and the deep *ho-ho-ho* of a burly farmer. Further, in grief the respiratory movements are much the same; but their rhythm, and the facial expression accompanying them, are usually quite different. In certain cases, however, laughing and crying become indistinguishable.

The question why we thus act under this peculiar stimulus is involved in considerable doubt; but the explanation of Mr. Herbert Spencer ("Essay on the Physiology of Laughter," written in 1860) is as yet by far the best, and grows more probable upon further study. Mr. Spencer argues that all highly-wrought feeling, being nervous excitement, has to spend itself somewhere; and does, in fact, spend itself in muscular action. When the character of this feeling is such that no special muscular action is pointed out, when there is no reason in clenching the fist as if to beat our adversary, nor in stamping the foot to grind him to powder, as we do in anger, nor any other appropriate muscular work derivable from the nature of the emotion aroused, then the pent-up excitement vents itself through the readiest and easiest muscular channels. Evidently the muscles round the organs of speech in civilized man are the readiest and easiest channel for the display of emotion. If we feel, we express our feelings by speech usually. Therefore if we are tickled by a ludicrous image, we smile. But if the wave of feeling be not exhausted by the smile, a fresh set of muscles is called into play—the respiratory. Great pleasure causes the blood to leap in the veins, as we say. We know how joy makes the heart beat and the bosom pant by consequence. This, then, is the second readiest line of escape for the awakened nerve force, and we use these muscles as being well accustomed to move under the stimulus of emotion, next after those of the lips. We laugh. But perhaps even yet we are burdened with unexhausted nervous energy; then we slap our thighs, we clap our hands, we roll about, and stamp with a frenzy of joy—all which simply means we use ranks of muscles further and further withdrawn from those habitually brought into play through emotion. Further, the continued spasmodic expirations operate by checking the indraught of oxygen by the lungs, to reduce the absorption of oxygen by the body, and so to check vitality and cause a return from the sudden excitement of the nerves to a more ordinary state.

Among the best known stimuli of laughter we may reckon these of wit and humour, of a sudden accession of pleasure, of liberty after restraint, of power gained after long subordination, of mere animal spirits, as in the very young, and of physical causes, as cold, tickling, and hysteria.

Passing to an examination of the ludicrous—that is, the nature of thoughts and scenes which provoke laughter—we find a doubt almost equally great as that which invokes the action of laughter. But this also tends to explanation under scientific psychological analysis, and it is generally believed that nearly all instances of the ludicrous repose on some patent incongruity. Not all incongruities are ludicrous, but the ludicrous is always (or at all events more often) incongruous. A weak man struggling with a heavy burden presents incongruity, but excites no laughter; a little man wearing a big hat assuredly excites a smile. Where is the distinction? It is usually believed to be in this:—In the first instance the man excites our pity: we wish to help him; if he is brave, we admire him: a good man struggling with adversity is a noble object. But in the second, the large hat attracting our attention and calling for a correspondingly heroic form beneath it, we find our expectation ruined by the actual feeble possessor of the imposing headgear, and we have an incongruity which at the first blush provokes the tendency to laughter. Many such situations are not in the least ludicrous to those who know the inner lives of the subjects of them; but it will be found that in this case the element of degradation has been destroyed. If, for instance, the diminutive hero has

a true heroic soul, and his actions and words bear the stamp of nobility, he rises to a stature above the average in our imagination, and we measure him by thoughts and not by inches: he is never more ridiculous in our eyes. The incongruity which excites laughter must never be too glaring. A drunken fellow is to most people irresistibly funny, but not to his suffering wife or shamed children: their sentiment is too deep. If a pompous man trips and falls into the mud, only to the damage of his fine clothes, we laugh; but we do not laugh if he has been unlucky enough to sprain his wrist as well. In most instances of the ludicrous (and so frequently as to lead the great Kant to consider this the law of the ludicrous) we are surprised by some extreme and not unpleasing incongruity crowning a long expectation. It is as if the stream of nervous excitement, dammed up for a few moments, is suddenly released and trickles off in happy bubbling noises along many small channels. When, after a great leap by an acrobat, a clown in his train follows with vast preparation, as if to rival the feat, but checks his preparatory run to pick up a straw and retire, the balked expectation of the rustics who crowd the circus explodes in welcome laughter.

But it would be easy to show that Kant's view is too narrow; it explains too few instances. The true view appears to be that it must be what one might call a downward or descending incongruity, or as some prefer to call it, a degradation. The phrase "degradation" is not, however, good, as we saw in the case of the drunken husband and father, where an unmistakable instance of degradation fails to provoke laughter; but this same case, if regarded as one of descending or ascending incongruity, is found to fit in with the theory completely. For to the outside observer the tottering, stammering fellow is a man, and that he should so fall beneath manhood is laughable because the expectation is greater than the performance, the nervous energy has been forced into small channels. But now let the wife try to think of this miserable, half-idiotic, besotted fool as a husband and a father, and the humiliated feelings fail to grasp the larger conception, the incongruity is ascending; the feelings have to take other channels than that of laughter. It is this which makes many a great soul in a pitiful body a saint to his own, a laughing-stock to others; it is this which causes falsehood and trickery to be a source of chuckling to the mean and of sorrow to the noble. It depends on whether our attitude is from great to small or from small to great as to whether we laugh.

As a piece of corroborative evidence, it may be remarked how, when our nerves are in ordinary play—as when we are walking quietly along, carrying a book, it may be—if we are suddenly confronted with an astonishing sight, alarming news, or what not, so that a large nervous excitement is demanded hurriedly, we find that the muscular actions tend to cease. The walk stops, the book falls, the jaw drops, the whole frame possibly collapses, and in extreme cases the sufferer sinks into a swoon. Hence exactly opposite causes from those of the ludicrous produce exactly the opposite kind of effects—a startling argument in favour of the view here explained.

LAUMONITE is one of the monoclinic zeolites. It is a mineral which undergoes alteration very rapidly, but the fresh specimen is transparent or translucent, with a vitreous or pearly lustre of a white, gray, or yellowish colour. Its hardness is about 3·5, and specific gravity 2·2. It is a hydrous silicate of alumina and lime; the loss of the water on exposure causes it to disintegrate. It is found in basalts and other amygdaloidal volcanic rocks, such as those occurring in the west of Scotland, the Island of Mull, and the north-east of Ireland.

LAUNCE (*Ammodytes*) is a genus of fishes belonging to the family Ophidiidae and order Anacanthini. The launces or sand-eels are very common on sandy shores of Europe and North America. The body is elongated and

scaleless. The dorsal fin is continued unbroken from just behind the head to a point in front of the tail. The vent is placed far back, so that the anal fin is comparatively short. The ventral fins are absent. The gill-openings are very wide. The Sand-Eel or Greater Sand-Eel (*Ammodytes lanceolatus*) is common on British coasts and on most of the shores of the North Sea. Its usual length is 12 inches, but it sometimes reaches as much as 18. The sand-eels are taken in large numbers on the British coasts, chiefly for bait. They are captured by the net, a single cast of which may bring to shore two or three bushels of launces. They live in large shoals. Porpoises prey largely on them. The back of this species is bluish, the belly and fins silvery white.

The Lesser Sand-eel or Sand-launce (*Ammodytes tobianus*) is a smaller species, and usually of a more brownish hue, with a tinge of red about the head. This species has the lower jaw produced into a process, by means of which it dips into the sand, forming burrows for retreat from the attacks of larger fish. Its greatest enemy is the mackerel. Like the preceding species it is caught chiefly for bait. Both launces appear to be generally distributed through Northern and Western Europe. In Scotland the sand-eel is known by the name of the Horner, and in the Isle of Man the two species are distinguished from each other as the Gray Gibbon and Red Gibbon. A third species, *Ammodytes siculus*, is found in the Mediterranean, but is rarely seen in British seas. There are three American species.

LAUNCESTON, a town and municipal borough of England, in the county of Cornwall, situated near the eastern boundary of the county, 19 miles E.N.E. of Bodmin, 20 miles N.N.W. of Plymouth, and 282 miles from London by the Great Western Railway. It stands on a hill which rises from the southern bank of the Attery, about 2 miles from its junction with the Tamar. The streets are irregular and narrow, but improvements have been made of late years. The church is a very remarkable structure of granite, ornamented with curious carved work. There are places of worship for dissenters, a small guildhall, and a grammar-school. On the hill on which the town stands are the ruins of an ancient castle founded by the Cornish princes, and known as Castle Terrible. It was held of the Conqueror by the earls of Moreton. The extent of ground which the ruins cover attests its former size and importance. Launceston is neither a manufacturing nor a commercial town, but depends on its retail trade and its markets, the latter being large and well attended. It was the capital of the county till 1838, when the assizes were transferred to Bodmin. The municipal borough is governed by four aldermen and twelve councillors. The population in 1881 was 5675.

Launceston, otherwise called *Dunhered*, received its first charter from Richard, earl of Cornwall, in the thirteenth century, and its privileges were confirmed by Richard II. and many subsequent sovereigns. In 1086 a cottage, dedicated to St. Stephen, was established here and afterwards converted into a monastery, whence it is said the present name is derived through *Lanstephen*. The town was formerly a parliamentary borough, and returned a member to the House of Commons until 1885.

LAUNCESTON, a town in the colony of Tasmania, the second in importance in the island. It is situated at the northern extremity of the county of Cornwall, and at the head of the navigation of the river Tamar, 35 miles above its estuary at Port Dalrymple, and 98 miles from Hobart. The town possesses a government house, military barracks, a jail, a good public library, a college and numerous schools, and several other public institutions and buildings. The greater part of the agricultural produce of Tasmania is exported from

Launceston, and there is an extensive and increasing trade with Australia, it being the nearest port to that continent. A railway, connecting Launceston with Hobart, was constructed in 1874. The population in 1881 was 12,753.

LAUNCH, a strongly built boat, and the largest attached to ships of war, in which it has taken the place formerly held by the long boat. The launch now carried by the larger warships is usually a small steamer, fully equipped, and armed with a light gun in the bow. Such boats are extremely useful for river service and for the conveyance of troops, stores, &c., between the ship and the shore. They are also valuable as guard boats, and the increasing use of torpedo boats will probably call for a further development of the armed steam launch as one means of preventing their attacks. The word *launch* is a form of the word *lance*, and is applied to a swift motion forwards; we launch an attack, a spear, or a ship when she first takes the water. The launch-boat was originally the boat which was kept always ready for launching over the ship's side.

LAUNCH is the sliding or movement of a ship from land into water. The vessel is built upon an inclined slip, having one end deep in the water. A row of blocks of oak are placed on the building slip in the direction of the length of the intended ship, so that their upper surfaces may be in a plane, making an angle of about three degrees with the horizon; and on these blocks is laid the keel. The vessel is supported in equilibrium by an outer framework or cradle, the bottom of which rests on planed timbers leading to the water, called the ways of the slip. When the vessel is ready to be launched these are greased, and everything which holds the ship in place unfastened, and she slides down to the water stem foremost. The cradle is lost, but the buoyancy of the water soon separates it from the ship, when it is recovered by boats. It is said during the process of launching for a lady to break a bottle of wine over the bow, and give the vessel its name. The *Great Eastern* was built with its side parallel to the ways, and its launching occupied three months.

LAUREATE, POET (from the Lat. *laureus*, the bay), an officer in the lord chamberlain's department of the royal household. The earliest mention of a poet laureate in England is in the reign of Edward IV. In the reign of Charles I. (1630), the first patent of this office appears to have been granted, which fixed the salary or pension attached to it at £100 a year, with a third of canary wine. The succession of poets laureate since the time of Charles II. has been—John Dryden, Nahum Tate, Nicholas Rowe, Andrew Marvell, Colley Cibber, Wm. Whitehead, Thomas Warton, Henry James Pye, Robert Southey, and William Wordsworth. Lord Tennyson is the present holder of the office. A compensation of £27 for the allowance of wine is now paid. The title seems to have originated from an old custom of the universities to present a laurel wreath to graduates in rhetoric and versification. The king's laureate was then imply a graduated rhetorician employed in his service. It was formerly the office of the laureate to write an ode on the birthday of the sovereign, and on other special occasions. The first has been wisely abolished, but the latter duty is still occasionally performed, the present occupant of the office having written odes on the death of the Prince Consort, the opening of the Great Exhibition of 1862, the marriage of the Prince of Wales in 1863, and of the Duke of Edinburgh in 1874. ("The Poets Laureate of England, being a History of the Office of Poet Laureate," by W. Hamilton, London, 1879.)

LAUREL. See BAY.

LAUREL-WATER. The leaves of cherry laurel chopped and bruised, and macerated in water for twenty-four hours, yield, upon distillation, a liquid possessing sedative and narcotic properties, which was formerly used in medicine to allay neuralgic pains, spasmodic cough, and

palpitation of the heart. It was introduced into the British pharmacopœia in 1839. At one time it had a fair reputation, but it is now more generally superseded by the use of hydrocyanic acid. It is sometimes used in minute quantities as a flavouring ingredient in sweetmeats, custards, &c., to which it imparts the flavour of bitter almonds; but this is a use for which it is certainly not adapted, as it contains a powerful poison, and where it has been used in excess it has caused death with all the symptoms of hydrocyanic poisoning. Serious mistakes have also occurred from the use by cooks of the leaves of the cherry laurel, instead of the leaves of the harmless sweet laurel or bay.

LAURENTIAN FORMATION is the name applied to the lower division of the Archaean rocks of North America, from their gigantic development along the St. Lawrence.

The pre-Cambrian rocks of Great Britain are sometimes called Laurentians, Sir R. Murchison considering the Lewisian gneiss of Scotland their equivalent.

The Laurentian rocks of Canada are all highly metamorphosed strata covering a large area. They consist of granite, gneiss, and schist, with bands of limestone containing the fossil *cozoon*, and beds of iron ore, apatite, and graphite.

LAURIC or LAUROSTEARIC ACID is obtained from the Sweet Bay-tree (*Laurus nobilis*), natural order Lauraceæ. It occurs also in croton oil, in cocoa-nut oil, and in spermaceti; and has been also produced artificially from cetyl alcohol. It crystallizes in white silky needles, and is soluble in alcohol and ether, but insoluble in water. It melts at 43° C. (109° Fahr.) The formula is $C_{18}H_{34}O_2$. It forms a number of crystalline salts called laurates. Lauric ether, or laurate of ethyl ($C_{18}H_{34}O_2 \cdot C_2H_5$), is a colourless oil of specific gravity 0.86, boiling at 269° C. (516° Fahr.). The sweet bay also contains a crystalline camphor known as laurin; it is insoluble in water, but soluble in alcohol and ether. The formula is $C_{22}H_{40}O_2$.

LAURINEÆ, an order of plants belonging to the Apetales, and consisting entirely of trees and shrubs inhabiting the warmer parts of the world, and in most cases aromatic, on which account several are mentioned in works on medicinal plants. The best known species in Europe is *Laurus nobilis* (the sweet bay), a beautiful evergreen, whose fragrant leaves are commonly employed to flavour confectionery. Other products of the order are—cinnamon, cassia, sassafras, camphor, and the avocado pear. The perianth has four or six divisions in two series; the stamens are four, eight, or twelve, in one, two, or three series, the innermost having no pollen; the anthers have two or four cells, opening by recurved valves; the ovary is superior, one-celled, with one or two pendulous ovules; the fruit is a berry or drupe, with the stalk often thickened or even expanded into a kind of cup; the seed is single, without albumen.

LAUSANNE, the capital of the Swiss canton of Vaud, is situated near the northern shore of the Lake of Geneva, on three steep hills, which project from Mont Jorat, and are separated by deep ravines. The situation of Lausanne is picturesque; but the interior of the town is not very pleasing, the streets being narrow and steep, though much has been done by artificial means to remedy the natural inconvenience of the site. The new quarters contain a number of handsome houses. The cathedral, a vast Gothic structure of the eleventh century, and the handsomest church in Switzerland, is adorned with a lofty tower, and also a spire 200 feet high. The Church of St. François is also a very old building. The castle, formerly the residence of the Bishop of Lausanne, is now the council-house of the canton. The supreme court of the Swiss confederation has been held here since 1875. The other remark-

able buildings of Lausanne are—the college, which contains a large library and a museum; the penitentiary; the charity schools; cantonal hospital, lunatic and blind asylums, barracks, and theatre. The educational institutions comprise, besides the cantonal college, military, drawing, and other schools, numerous literary societies, and collections of art and science. The town is much visited by tourists, and has a large resident English population, who are partly attracted by its educational advantages, and there is a large and handsome English church. The total population is 30,000. Manufactures of woollen cloths, paper, leather, watches, and jewelry are carried on. In the town are several public baths,

libraries, an English chapel, &c. The environs present very delightful scenery. Steamers from Geneva and other points on the lake put in daily at the suburb of Ouchy, which is built on the shore of the lake. The house inhabited by the historian Gibbon is still shown in Lausanne. Madame de Staël had a residence in the vicinity. Voltaire, previously to his settling at Ferney, lived at Monrepos, a little distance from Lausanne, on the Bern road; and Byron wrote his "Prisoner of Chillon" at Ouchy, the port of Lausanne, on the lake.

Lausanne derived its name from the ancient *Lausantium*, which stood a little to the west, in the plain of Vidy. Various Roman remains have been discovered



Lausanne.

there and elsewhere in the vicinity. Before the Reformation Lausanne was a rich bishopric. It was taken in 1536 by the Bernese, and governed by an officer from Bern till 1798, when it fell into the hands of the French, who made it the capital of the department of the Léman.

LAUTERBRUNNEN, a village of Switzerland, in the canton, and 38 miles S.S.W. of Bern, in a valley of the same name, which runs from the S.E. extremity of Lake Thun, and S.W. of Lake Brienz, to the mountains W. of the Finster-Aarhorn. It is about 15 miles long, with an average breadth not exceeding a mile, hemmed in on all sides by lofty branch-chains of the Bernese Alps, which form in many places vast precipices, over which numerous mountain streams fall. They approach so near each other that the sun is not seen till he has been four hours above the horizon. In this valley is the famous waterfall of the Staubbach, which is never of great volume, and decreases so much in summer as sometimes to disappoint the expectant traveller. It descends from a projecting rock in a single fall of 980 feet, the greater part of it being converted

before it reaches the ground into minute particles of spray, which bedews the meadows and trees to a considerable distance. In the morning, during sunshine, it resembles a transparent, silvery veil, wifted to and fro by the breeze, and frequently presenting the varied hues of the rainbow.

LA'VA is the molten rock that flows from active volcanoes during eruption; the name is also applied to the several forms of the same in its hardened condition. Lava and steam are the materials most abundantly ejected from a volcano during eruption. The lava ascends the neck of the crater, and either flows over the lip and down the sides of the crater, or else it bursts the side of the crater and rushes forth. In the neck of the volcano large volumes of steam are given off from the liquid lava. This escapes with explosive violence and hurls fragments of the liquid lava upwards, which solidify in the air, taking forms generally more or less rounded or elliptical. The larger are termed *bombs*, the smaller *lapilli*. Internally they may be porous or finely vesicular. During its flow down the sides of the volcano immense quantities of steam are disengaged from the lava stream, and its surface is thrown

into all manner of fantastic shapes by the escaping vapour. As the stream moves onward its surface solidifies, and its motion is accompanied by the cracking and rattling of its cindery crust. The rate of flow of a lava stream is largely dependent on the slope of the volcano and the fluidity of the lava. Large streams usually flow faster and further than small ones, and the destruction wrought by them when they invade cultivated and inhabited districts is appalling. The numerous phenomena associated with the flow of lava cannot be noticed here in detail. Full accounts of them will be found in the many published descriptions of remarkable volcanic eruptions and in special treatises on volcanic action.

The composition of lava varies greatly according to the rocks from which it is produced. There are probably lavas corresponding to the several varieties of crystalline rock, but as the mineral constituents have at most only partially crystallized out, these varieties are seldom recognizable. In ultimate chemical composition lava consists of silica united with the bases alumina, iron, lime, magnesia, potash, and soda; mineralogically speaking, it consists of a melted mixture of felspar and augite. Lavas may be conveniently separated into acidic and basic lavas. In the acid lavas the silica exceeds about 75 per cent.; the fused mass is largely composed of felspar. These rocks are, as a rule, light coloured. Their specific gravity is less than that of the basic varieties; they have a great tendency to assume a glassy (vitreous) form. The constituent minerals are not well developed, and free quartz only very rarely crystallizes out. In the fused state they do not become very liquid. In the basic lavas the silica is under about 60 per cent., and the rock is largely composed of augite; the colour is dark and the specific gravity high. Glassy forms are not abundant, the rock having most generally a crystalline texture; free quartz is never present. The rocks are much more easily fusible than the acidic varieties, and become very liquid. The Hawaiian lavas are the most remarkable of this class, that of Mauna Loa being often as liquid as honey, and at Kilauea (an adjoining crater) the explosions of steam throw the rock into fine filaments, known as Pele's hair.

The structure of lava varies greatly; obsidium and tachylite are vitreous glasses without any of the mineral constituents crystallized out; while dolerite and basalt are, in some cases, composed almost altogether of a tangled aggregation of fine crystals; between these two extremes there is a long series of stony lavas. Besides the ordinary lava flow, whether it be glassy, stony, or crystalline, there are the vesicular, scoriaceous, and tuffaceous varieties. The first two of these are produced by the expansion of the steam imprisoned in the rock, the most familiar example being ordinary pumice. Tuffaceous lavas are produced by the ejection of volcanic dust, which, falling in regular beds, becomes subsequently consolidated by pressure and percolating water.

LAVAIL, the capital of the French department of Mayenne, is situated 186 miles W. by S. from Paris, and has 25,613 inhabitants. The principal part of the town stands on the slope of a hill, on the right bank of the Mayenne, and consists of irregularly built, narrow, steep, and crooked streets of white-washed timber-framed houses, each storey of which overhangs the one below it, so that a considerable part of the buildings overhang and darken the streets. From the midst of these dismal buildings, and close to the river, rises the extensive old castle of the lords of La Tremouille, surmounted by a lofty round tower, which formed the keep; this castle is now used as a prison. Near the castle an old bridge thrown across the river leads to a suburb, regularly built with wide straight streets, on the left bank of the river. Another suburb, called Avenieres, is interesting on account of its elegant church, which dates from 1040. The river is also crossed by a handsome

railway viaduct built of solid granite, over nine arches of 39 feet span, 591 feet long, and 92 feet high. The principal buildings in the old town are—the churches of La Trinité, des Cordeliers, and St. Vénérand; two hospitals, founded about the year 800; the public library, town-hall, theatre; a large and handsome linen market. The town has a tribunal of first instance, a tribunal and chamber of commerce, and a college. It is the centre of a large manufacture of table and household linen and linen yarn, for the sale of which there are weekly markets; calico, flannel, cotton handkerchiefs, serge, soap, leather, &c., are also made; and there is a good business done in flax, wine, brandy, clover seed, timber, iron, marble, &c. Laval was taken by the English in 1466, but recaptured by the French in the following year; and suffered greatly in the Vendean war at the end of the last century. In 1793 it was held by the Vendéans, who, in October of that year, under the command of Larochejacquelin, defeated with terrible slaughter a large army of republicans near the town. The railway from Paris to Brest passes through Laval.

LAVATER, JOHANN KASPAR, the celebrated physiognomist, was born 15th November, 1741, at Zürich, where his father was a physician. From his boyhood he was remarkable for his piety and his love for the fine arts, and having chosen the ministry as his vocation he went through the usual course of study at Zürich, and was ordained in 1762. His first public act was that of denouncing, in connection with his friend the painter Fuseli, a magistrate who had been guilty of oppression and extortion. The means he adopted were a little irregular, but they were completely successful, and the enthusiasm he had displayed for the cause of justice and right gained him the warm approbation of his countrymen. In 1766 he married, and the same year took part in founding the Helvetic Society, which was designed to awaken the patriotism of the country, and to aid further this work he prepared and published his "Schweizerlieder" or Swiss Lays (Bern, 1767). His next work was the "Aussichten in die Ewigkeit" or Prospects of Eternity (three vols., Zürich, 1768-73), which passed through several editions. In 1778 he became deacon of the Church of St. Peter, where he developed great gifts as a preacher, and in this church he continued to minister until his death. As a theological writer and spiritual director he exercised an immense influence during his lifetime, but this influence has long wholly passed away, and he would hardly be remembered but for his work as a physiognomist. He possessed keen powers of observation, and was an excellent judge of character, and he formed the opinion that the human face formed a perfect index to the disposition, so that physiognomy might be reduced to the certainty of a science. In 1769 he began to collect the portraits of remarkable men of all ages, and in 1775 there appeared the first volume of his "Physiognomische Fragmente zur Beförderung der Menschenkenntniss und Menschenliebe." Three volumes more were subsequently issued to complete the work (Leipz., 1775-78), and he afterwards published an edition in French with extensive additions. The book was received at first with extravagant praise, but it afterwards became the subject of merciless ridicule. It is not accepted as a contribution to science at the present day, but it shows that Lavater possessed, as we have said, considerable insight into character, and the illustrations with which it was enriched makes the original edition very valuable to artists. When the French Revolution broke out Lavater, in common with many others, hailed it with joy; but its lawless and bloody progress filled him with disappointment and horror. When the French established their influence in Switzerland his patriotic conduct cost him first his liberty and then his life. He was for some time a prisoner at Basel, and on 26th September, 1799, he was shot in the breast by a French soldier while humanely interfering to protect some

poor people of Zürich from the brutality of some of Massena's drunken troops. He lingered a long time, bearing his sufferings with the greatest fortitude, but died from the effects of the wound 2nd January, 1801. His life, written by his son-in-law, George Gessner, was published the following year.

LAVATERA (in honour of the two Lavaters), a genus of plants belonging to the order *MALVACEÆ*. *Lavatera arborea* (tree mallow) is a native of Italy, Spain, Portugal, the north of Africa, and the Canary Islands, on maritime rocks; also in Britain, in the Isle of Wight, on Portland Island, in Cornwall, and Devonshire. It is the *Malaché* of Theophrastus ("Hist. Pl.," i. 5; i. 14).

None of the species of *Lavatera* are of any importance or value, except as ornamental plants. Many of them are hardy, easily cultivated, and well adapted for shrubberies. The greenhouse and frame species will thrive well in a mixture of loam and peat, or any light soil. They may be planted out during the summer against a south wall, and if protected in the winter by a mat will generally survive throughout the year. The perennial species grow in any kind of soil, and may be propagated either by dividing the plants at the root or by seeds. The annual and biennial kinds should be sown in the open border during the spring.

LAVENDER, the name of hoary, narrow-leaved, fragrant bushes inhabiting the south of Europe, the Canaries, Barbary, Egypt, Persia, and the west of India, with generally blue flowers. The two species of most interest are the Common Lavender (*Larandula vera*) and Spike Lavender (*Larandula spica*). Lavender is grown to a great extent for perfumery purposes in Hertford and Surrey. The essential oil is obtained by distillation from the flowers, and is dissolved in spirits of wine to form the perfume known as Lavender Water.

The oil yielded by *Larandula spica* differs considerably from the oil of *Larandula vera*, and is termed Oil of Spike or Foreign Oil of Lavender. This sort is much less fragrant and of a deeper green colour than the oil of the true lavender, and is merely used in painting or to adulterate the genuine oil, which is so extensively employed in the preparation of perfumes.

LAVER, a substance sometimes used as food, consists of the fronds of marine plants belonging to the genera *Porphyra* and *Ulva*. Common purple laver is furnished by *Porphyra laciniata* and *Porphyra vulgaris*, two species common on rocks and stones in the sea on many parts of the British coast. They derive their botanical name from their beautiful purple or violet colour.

LAVOISIER, ANTOINE LAURENT, a celebrated French chemist, was born at Paris, 26th August, 1743. His father, a wealthy tradesman, caused him to be well educated, and encouraged him to devote himself to the study of science, for which he early displayed a strong predilection. His first public work was to enter into a competition for a prize offered by the Academy of Sciences for the best memoir on lighting the streets of Paris. To render his eyes sufficiently sensitive he shut himself up in a darkened chamber, the walls of which were hung with black, for six weeks. His zeal obtained for him the gold medal of the academy in 1766, and the insertion of his paper in its *Transactions* in 1768. In 1769 he obtained the lucrative post of farmer-general of the revenue, and for over twenty-four years devoted himself to the public works of France and to the development of the science of chemistry. As a public man he made a series of important experiments in scientific agriculture, obtained the abolition of several oppressive taxes, and succeeded in relieving the Jews of Metz of an odious impost, a relief of barbarous ages. Appointed director of the national powder works in 1776, he largely increased the produce of saltpetre, and so improved the manufacture of gunpowder as to add one-third to its explosive force. He also did some useful work in connection with the commis-

sion on weights and measures, and the collection of the taxation in France. As a chemist he was yet more celebrated, and his discoveries, and investigations of the discoveries of others, have for ever associated his name with the progress of this science. For the account of these see **CHEMISTRY**. Valuable as were his labours it is probable that, had his life been spared, he would have been able to accomplish greater results, but in 1794 he became involved in the prosecution instituted by the leaders of the Revolution against the farmers-general. The charge brought against him was of the most ridiculous character, and the proceedings of the so-called trial a sanguinary farce. But he was wealthy, and as the sentence of death involved also the confiscation of his property he was condemned to death 6th May, 1794. A petition enumerating his valuable public services, and speaking of his eminence as a man of science was presented in his favour, but the only reply it received was the remark that "the republic has no need of philosophers." On the 8th of May, two days afterwards, he was led amidst a crowd of others to the guillotine, and calmly and tranquilly met his fate at the early age of fifty-one. A complete edition of his writings, in four vols. 4to, was issued by the government of Napoleon III. at Paris in 1864-68.

LAVO'RO, TERRA DI, a province of the kingdom of Italy, now called *Caperta*, corresponding to the greater part of the ancient *CAMPANIA*, is bounded by the Mediterranean on the south-east, and has landward the provinces of Naples, Avellino, Campobasso, Chieti, Teramo, and Aquila, with the former Roman States on the north-west. The surface in the east is covered with ramifications of the Apennines, but elsewhere are many fertile plains; and this is one of the richest parts of the Italian peninsula, though along the coast are marshy and unhealthy tracts. The chief rivers are the Volturno and the Garigliano; the principal inlet of the sea is the Gulf of Gaeta.

The products of the province comprise wheat, oil, silk, fruit, and wines. The area is 2234 square miles, and the population in 1881 was 725,535. It is divided into five districts. Good organzine and sewing silk are made in Caserta, cotton and woollens at P. L. A. common woollen cloth at Arpino, and there are extensive tanneries at Santa Maria di Capua. The capital is CASERTA.

LAW. A law (*lex*) has been defined to be a command or rule of the supreme power in a state addressed to all the members of a given community who owe obedience to such supreme power. To make it efficient there must be some sanction, or penalty, or punishment, or means of enforcing obedience to it. All the laws of any given country may be comprehended under the term the Law of such country; though the term law, as will be presently explained, comprehends more than all the laws (*leges*), properly so called, of any given country; for it comprehends those rules of law which are not laws or statutes. The Law that exists in any given country is called the Positive Law of that country: it is so called simply as being or existing, as placed or fixed.

The word law is loosely used in various other senses. The Law of God, the Moral Law, the Laws of Nature (Laws of Gravitation, of Health, &c.), are sufficient instances. A true law is a command enforced by a penalty. It is seen at once that none of these falls strictly within that category. The *Law of God* is an expression reverently applied by those of various faiths to their own revealed scriptures and traditions. The Law of God means one thing to the Christian, another to the Jew, another to the Mohammedan, &c. The *Moral Law* and the *Laws of Nature* are expressions used by philosophers to signify the highest expressions of philosophical truth; and as knowledge advances these "Laws" are constantly being remodelled. The moment a new fact arises in apparent contradiction to the law, that law is abandoned and a new one

formulated to cover the new fact, always providing the fact to be thoroughly determined. Indeed, in this sense the word "law" means but little more than a "hypothetic generalization." Further, though the expression "breach of the moral law, or natural law," &c., is sometimes used, it is very inaccurate. It is evident that it is impossible to break a hypothesis or a generalization. One's moral actions or physical actions inevitably produce their full consequences, whether they tend to greater or less vitality, to development or retrogression. The analogy with a physical law breaks down at every point. Law (human law) consists of commands addressed to voluntary agents, which they may obey or disobey; and the law is not rendered null and void by being broken. Natural laws, on the other hand, are not commands but assertions respecting the invariable order of nature; and they remain laws only so long as they can be shown to express that order. Again, human laws have no meaning apart from the existence of human society; natural laws express the general course of nature, of which humankind in society forms only an insignificant fraction. (Huxley.) In what follows law is therefore to be taken to mean the law of a state or a community.

The object of law should be to secure individual freedom, which is accomplished by the absolute duties which are imposed upon all. The foundation of liberty or freedom is therefore obedience to positive law. Not that obedience will always secure freedom, for the power which exacts obedience may be tyrannical; but without obedience to one power there can be no freedom in a community.

If the Christian rules of life were followed in all their strictness by all mankind, government and law would still be necessary. Man can acquire nothing except by labour; he thus obtains dominion over external things. If we should suppose that a time may come when men shall seek less than they do now the appropriation of property to their several use, we cannot conceive any state of society in which rules as to ownership shall not be necessary. Man also interchanges the products of his industry, and makes agreements as to the various transactions of life, which are capable of almost infinite diversity both as to form and substance. Accordingly rules are necessary to regulate such agreements, contracts, and obligations which arise otherwise than by contract. Further, rules of law are required to regulate many things in the relation of husband and wife, parent and child, with reference to their persons and property. Finally, rules of law give the owner of property a power of disposing of this property after his death, by a testament; and in case of intestacy they determine the persons to whom it shall go. These four divisions comprehend what the Romans viewed as belonging to the department of *Privatum Jus*, and it is a department of law which exists by the same necessity that society does. It is not directly concerned about morality in any degree: a man may acquire property for immoral purposes or use it immorally. His conduct in the matter is beyond the province of law, so far as simply concerns the use that he makes of his property. Marriage may not be such a union as accomplishes the true end of marriage; the law has nothing to say to that provided its regulations are duly observed.

Besides the department of Private Law, there is the department that concerns government and administration, the limits of which it is difficult to define; and accordingly this is the department in which the rules of law most frequently extend beyond their proper limits. Criminal Law belongs to this department; and also, properly considered, all judicial procedure.

The original law of any state exists in the form of immemorial custom, which has long been recognized by the supreme power, or by those to whom the supreme power has delegated the function of declaring what is law. These customs are not called laws, but customs, rules of law,

and the like. But there is in all society a constant growth of law produced by new circumstances and new wants; and this is the matter which society furnishes to the judge, and which within certain limits he may declare to be law as the occasion arises. The judge does not make this law: he accepts it, and declares it to be law. In the case of laws properly so called (*leges*), statutes, or acts of Parliament, the judge has to interpret the law; but he adds nothing, if he does his duty—he merely declares the rule of the law-maker or legislator, as well as he is able to ascertain it.

That part of law which is originally declared in writing by the supreme power, or by any persons to whom this power is delegated, is sometimes called Written Law. An Act of Parliament is an example of this kind of law. That law the original of which is not in writing, though writing may be the evidence of its existence, is called Unwritten Law. Such is Customary Law, or law generated by custom.

Law may be, and is sometimes, divided into Civil and Criminal. In the Roman system *Jus Civile* was the peculiar law of Rome, as opposed to all other law; and sometimes when we speak of the Civil Law we mean the Roman law as received in Europe. In the English system the term Civil Law, as opposed to Criminal, is ill defined. The distinction, in fact, is only made with reference to procedure, and then only in a limited degree. If a man brings an action to recover a piece of land that belongs to him and is held by another, or if he brings an action to recover a debt, the proceeding is a civil proceeding; but this is not what is meant by the opposition of Civil and Criminal. If a man sustains an injury from another, by which he acquires a right of action for damages or compensation, a right solely founded on the wrong, his remedy is a civil proceeding. If the proceeding against the wrong-doer is not for compensation or damages, but merely to bring him to punishment, it is a criminal proceeding. In fact, a criminal offence is one committed against the sovereign of the state; a civil offence one committed against a fellow-citizen. Many offences partake of both characters.

That law which is now commonly called International Law, or the Law of Nations, is as yet hardly entitled to be called law. The nature of this so-called law is explained in the article INTERNATIONAL LAW. See also COMMON LAW, LAW-MERCHANT, CRIMINAL PROCEDURE, EQUITY, and JURISPRUDENCE.

LAW, JOHN, a celebrated financier and speculator, was born at Edinburgh in April, 1671. His father, who had acquired considerable wealth as a goldsmith and banker, died when John was at the age of fourteen, bequeathing him the estate of Lauriston near Edinburgh. During his youth he seems to have studied hard, but he was prodigal and reckless, and in 1694, having killed a man in a duel, he was tried for murder at the Old Bailey. His life was spared, but he was ordered to be detained in prison, from which he managed to escape and find refuge in Holland. In the description of him issued after his escape, he is portrayed as a "black lean man, about 6 feet high, large peck holes in his face, big high nose, speech broad and loud." In 1701 he returned to Scotland and published a pamphlet entitled, "Money and Trade Considered, with a Proposal for Supplying the Nation with Money," which attracted some notice, but had no practical result. Finding his scheme rejected, he returned to the Continent, and after some years spent in travelling, during which he gambled largely, he managed to insinuate himself into the good graces of the Duke of Orleans. On the death of Louis XIV. he returned to Paris, from which he had been expelled as a suspicious character, and proposed to his former intimate, the Duke of Orleans, now regent, a series of schemes for the restoration of French finance, which at that period was in the most deplorable condition. At first, however, his success was limited to procuring the sanction of the government

to his establishment of a private bank of circulation with his own funds and those of some associates. With a capital of £300,000 this bank was established by letters-patent in May, 1716. In a short time his notes rose to a premium, and the bank appeared so prosperous that he was allowed to develop some additional features of his scheme, and convert his private bank into a state bank, which was also connected with the Mississippi Company, with rights of sovereignty over the newly acquired Louisiana, the mineral and other wealth of which was painted in glowing terms. The monopoly of tobacco and the farming of the revenue were committed to the new institution, with which were amalgamated all the companies trading to the East, and something like a monopoly of the commerce of both hemispheres was in its hands. The notes of the bank were a legal tender, and investors were enticed by the gigantic programme of the company. The French public were seized with a mania for speculation, and a perfect frenzy for gambling set in which raged for about two years. Then the bubble burst, and after a series of severe financial shocks, the bank was destroyed and the company reduced to a shadow, multitudes being ruined in the process. In December, 1720, Law, who in the beginning of the year had been controller-general of finance, in which capacity he was courted and caressed by the highest personages in church and state, fled secretly from France with a few hundred louis-d'ors, the wreck of his colossal fortune. After a wandering life of a few years he died at Venice in indigent circumstances. 21st March, 1729. (See Wood's "Life of Law," Edinburgh, 1821.)

LAW, SUMPTUARY. See SUMPTUARY LAW.

LAW-MERCATORIA, or LEX MERCATORIA, in a general sense, denotes the usages and customs of merchants, which, having been adopted as part of the law of most countries, and particularly of maritime states, for the protection and encouragement of trade, have been termed a branch of the law of nations.

The term *Lex Mercatoria*, when used with reference to English law, like the *Lex et Consuetudo Parliamenti*, merely describes a general head or division of the system. What customs or rules are comprehended under that division must always be matter of law for the consideration of the judges; and it was said by Chief Justice Hobart, that, if they doubt about it, they may "send for the merchants to know their custom, as they may send for the civilians to know their law." The latter mode has frequently been adopted in modern times, and evidence of mercantile customs is frequently given before juries. When the custom is ascertained, the court may declare it to be legal or not, according to their judgment; for the expression, that the court is bound to take notice of the general law of merchants, does not mean, or should not mean, that the custom, simply as such, must be recognized as law by the judges. The recognition of the custom by the judges makes it law.

LAWES, HENRY, Mus. Doc., a musical composer dear to us as the friend of Milton and composer of the music to the lovely masque of "Comus" which Milton wrote, was born at Dinton in Wiltshire at the close of 1595. He soon devoted himself to music, and, coming to London, was permanently engaged at the Chapel Royal in 1625. "Comus" was composed in 1634, and produced at Ludlow Castle that year, Lawes himself taking a subordinate character. His music, just as he put it on paper, is in the British Museum among the MSS. there. A set of versified psalms, with Lawes' music, appeared in 1637, and among the introductory verses is Milton's sonnet—

"Harry, whose tuneful and well-measured song
First taught our English music how to span
Words with just note and accent."

It is a beautiful piece, ending with a delicate comparison of himself and Lawes to Dante and his singer-friend

Casella. Lawes wrote through the Commonwealth, setting Herrick's "Hesperides" among other things; and in 1660 he again entered the Chapels Royal, and wrote an anthem for Charles II.'s coronation. He died two years later, 1662. He seems to have taken the Royalist side; his brother William fought in Charles' armies, and indeed was killed at the siege of Chester, 1645. Lawes' music seems to us to lack melody, but all the poets of his time vied with each other to get him to set their verses. He seems to have treated music as a handmaid to poetry, rather than as possessing beauties needing independent cultivation.

LAWN, a space of ground covered with grass, kept short by mowing, and generally situated in front of a house or mansion.

Previous to laying down, the ground intended for a lawn should be properly trenched and drained, in order that such trees and shrubs as may afterwards be planted upon it should succeed well. After trenching, the soil should be allowed to subside, and the greatest care should be taken to make the surface perfectly even, otherwise a great expense will be afterwards incurred by the loss of time in mowing, which can neither be so quickly nor so well performed where the surface is uneven.

If turf can be readily procured, a lawn is at once produced; and by such means a more uniform distribution of grass may be obtained than by any other means. The surface of a well-fed meadow, or of an old common, closely cropped by sheep and geese, affords the best kind of turf; and if any tall or coarse grasses should be mixed with it, no inconvenience will arise, for everything of this sort will eventually disappear under close mowing; and such only as are dwarf and suited to the soil will ultimately remain. Where a turf is to be produced by sowing, the seeds of such species as are indigenuous to the locality, and possess at the same time the property of being dwarf and fine, are to be preferred; but in the event of this method of forming a lawn being adopted, it is always desirable that a narrow slip of good turf should be carried all round the circumference.

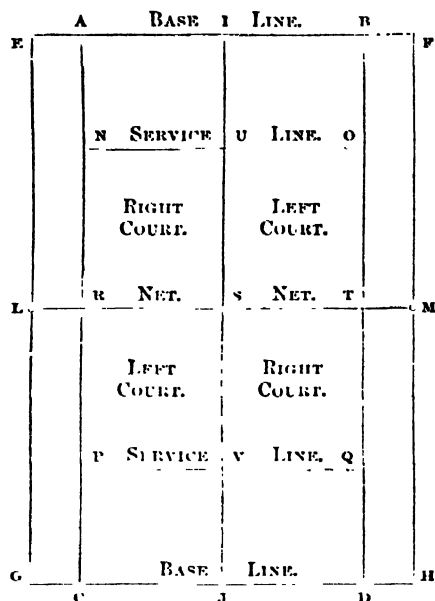
Lawns, when once established, require only to be kept neat by the ordinary routine of rolling, mowing, and sweeping, except keeping the surface perfectly even by filling up small hollows with screened mould early in spring.

LAWN TENNIS, the name of an open-air ball game, which, though of comparatively recent introduction, enjoys the most extensive popularity in England, and is fast gaining favour elsewhere. It is played with balls of hollow india-rubber, about $2\frac{1}{2}$ inches in diameter, and weighing 2 oz., which are struck by rackets made with a light frame and crossed with a network of catgut. Rackets of different make vary widely in weight and in manner of stringing, and within prescribed limits as to extreme size as to shape also; they are skewed and bowed in different ways to suit the preferences of different players.

A level piece of turf is the best site for a lawn-tennis court, which should be frequently cut, rolled, and watered. By wearing rubber-soled shoes the player will secure a sure footing, and save the court, since ordinary heels cut the turf. The court is laid out as in the accompanying diagram, the lines being marked with whitewash or paint. A very good winter court is made with cinders rolled very hard. Asphalt courts are not so successful.

First mark the sides of a parallelogram A B (27 feet) x D (78 feet), which, with the parallel lines D C and C A, form the boundaries of a single court for a two-handed game. Extend A B to E F (36 feet), and C D to G H, and draw the lines F H and E G, to indicate a double court for four-handed games. Drive stakes at L and M, midway between E and G and F and H. These are to support the net, I N, which will sag too much in the middle (where it should be 3 feet high) unless the stakes are held in position by cords running outward to pegs in the turf. Indeed,

usually a rod is inserted in the ground at the point *a*, with a hook or chain at the top of it, which holds the upper cord of the net and maintains it at the ordained level. *A B* and *C D* are called "base-lines." Twenty-one feet from the net, draw the "service-lines," *N O* and *P Q*. Then draw the centre line, *I J*, and the court is complete for two, three, and four handed games.



PLAN OF LAWN-TENNIS COURT.

A few moments' observation of lawn tennis in play enables the novice to understand this simple game. It is another thing to play it well, since proficiency is a matter of natural aptitude and constant practice. For the instruction of persons who have no opportunity of seeing the game in operation, the elementary steps may be accurately indicated with the aid of the diagram. Where two persons play, one is called "striker-in," or "server," and the other "striker-out." Suppose the server to be playing from the side *A B R T*, he places one foot on, or within, the base line *A T*, and the other foot without. In this position he strikes the ball with the racket so as to serve it over the net into the corresponding right court, *S T Q V*, where the striker-out awaits it, standing a little behind his court. The striker-out lets the ball bound once, and before it reaches the ground a second time he must strike it back over the net so it will fall anywhere within *A B R T*. Now, the server is required to send it back so that it will fall anywhere within *C D R T*, and to do this he may "volley" the ball (that is, strike it before it reaches the ground), or strike it after one bound. The ball is sent thus back and forth so long as it is in play—that is, until it twice touches the ground in one flight, or is struck out of court or into the net, or strikes the person of either player, in which case the ball is said to be "dead." When a service ball strikes the top of a net, yet passes over, it is called a "let," and does not count. A failure to keep the ball in play makes a score for the opponent. A ball is not in play until it has been served as above into the court of the striker-out; it must actually strike the ground in that court. A failure to serve within the court of the striker-out is called a "fault." Two successive faults count a score against the server. The second ball is served from the left base line, *C B*, into the left court, *R S V P*; and so on, from right to left, until the game is out.

The modern game is counted like ancient tennis. Before either player has scored, the score is called "Love all." The first score, or ace, counts fifteen; the second, fifteen more, or thirty all told; the third, ten more, or forty; and the fifth scores game. When both sides are forty at the same time it is called "deuce;" then two successive scores, on either side, are necessary to win. The first score after deuce is called "advantage." If the next score is in favour of the opponent, then it is deuce again, and so on until one or the other makes two successive scores. Or, to avoid a long succession of "deuces," it is often agreed to play "advantage all," in which case the second deuce is called by this name, and the next score decides the game. In the second game the striker-out becomes the server, or striker-in. They alternate as servers until one side has won six games, thereby winning the "set." *K P U G* indicate the boundaries of the court for four-handed games. Partners are right and left. They alternate in serving; and, in striking out, the right partner takes all balls served into the right court (his partner covering his flank to stop missed balls), and the left partner takes all balls served into the left court. The partner who is not serving usually plays in near the service line, toward his own side, or the centre, it being the duty of the server to defend the rear of the court. In three-handed games it is two against one, the partners playing as in four-handed games.

In four-handed games one partner plays forward and the other back. The non-server should stand well to the right or left, so as not to interfere with his partner's service, and come forward to the centre of the court the moment the ball is in play. The forward partner should take those strokes that come fairly to him, leaving the others to his partner. He should not be too anxious to volley, but should play these strokes only when it can be done with effect. It cannot be too frequently enforced on the attention of beginners that steady play wins more games than clever play. The player who keeps well back on the base line, and drives hard to the opposite base line, is a more formidable opponent than he looks. In such play a forward partner should not interfere till he can do so with effect. For instance, if he sees both opponents right or both left, he may volley into the unguarded space. This is useful and good play, but to dance about at the net, striking some balls and missing others, is bad play. The back partner should be, as it were, captain of the team, and call out to his partner when to leave a ball or take it. In general, the back player should keep the game going, and carefully return balls. The forward player should try to puzzle the opponents. In other words, the forward player should be principally occupied with the attack, and the back player with the defence.

LAWRENCE, GENERAL SIR GEORGE ST. PATRICK, the eldest of a famous brotherhood, was born in 1805. He joined the Bengal Cavalry in 1821, and in 1838 he took part in the campaign in Afghanistan. He was for some years military secretary at Cabul, and afterwards commissioner at Peshawur. In both capacities it was his misfortune to be taken prisoner, in 1842 and again in 1848. The outbreak of the Mutiny found him agent for Rajputana, and in this capacity he rendered most valuable assistance in maintaining the peace of that province with the most inadequate forces, and by some well-conducted military movements against the rebels. He retired from active service in 1864, after forty-three years passed in the army of his country, during which he had taken an honourable and prominent part in three of the most memorable Indian campaigns of the period over which his service extended. He died in November, 1884, in the eightieth year of his age. His fame is overshadowed by the more celebrated achievements of his younger brothers, but his career was most useful, and he enjoyed during his lifetime a reputation for the highest bravery and chivalry.

LAWRENCE, SIR HENRY MONTGOMERY, K.C.B., an eminent Anglo-Indian officer and official, was born at Matura in Ceylon in 1806, educated at the diocesan school of Londonderry, and afterwards at the Military College, Addiscombe, and entered in 1821 the service of the East India Company as a cadet in the Bengal Artillery. He soon acquired a reputation as a very able and intelligent officer. Serving in the Cabul campaign of 1842 with Sir George Pollock, he was made a major, and afterwards filled two important political posts—first as assistant to the political agent in charge of British relations with Lahore, and then as British resident at the court of Nepal. He played a conspicuous part in the campaigns of the Sutlej, and for his services was made a lieutenant-colonel and a military Companion of the Bath. In the interval between the first and second Sikh wars he was resident at Lahore, and agent for the governor-general on the north-western frontier, and for his able discharge of his important duties was made a K.C.B. in 1848. On the annexation of the Punjab in 1849, Sir Henry Lawrence was appointed by Lord Dalhousie president of the board for the reduction and government of the newly acquired territory, one of the members of the board being his younger brother, Sir John Lawrence. Great was the success of his measures, civil and military, for the pacification and settlement of the Punjab. The Sikh army was disbanded, an armed police was established, roads were made, and works of irrigation executed on an extensive scale. In 1854 he became a full colonel and honorary aid de-camp to the queen. At the outbreak of the Indian Mutiny Sir Henry had been ordered by his medical attendants to revisit Europe, and was actually on his way to England, but at the pressing request of the Indian government he gave up his European visit, and proceeded to Lucknow as chief commissioner in Oude. His measures for guarding against mutiny were very judicious. He did all that prudence and foresight could suggest to prevent an outbreak, while he rapidly fortified and provisioned the position which he had selected to defend. These precautions proved the salvation of the English in Lucknow, where the mutiny broke out on the 30th of May, 1857. On the 1st of July Sir Henry occupied a room in the Residency, very much exposed to the enemy's fire, but which no entreaties would induce him to leave. On the 2nd he was mortally wounded by a shot. He lingered on in great suffering till the morning of the 4th, when he expired. ("The Life of Sir Henry Lawrence," by Sir Herbert B. Edwards and Herman Merivale, London, 1872.)

LAWRENCE, JOHN LAIRD MAIR, BARON, younger brother of the preceding, was born 4th March, 1811. He was educated first at Foyle College, Londonderry, and then at Haileybury, where, at the age of sixteen, he carried off the chief prizes, and in 1827 entered upon his career as a civil servant of the East India Company. Commencing with the grade of writer, he was appointed, in 1831, assistant to the chief-commissioner and resident at Delhi; and earning by his diligence and abilities promotion from one step to another in the Delhi territory, he received in 1846 the important post of commissioner of the territory just then ceded to Great Britain at the close of the first Sikh war. His administrative abilities now found ample scope, and the district intrusted to his charge, though peopled with Sikhs against whom we had but lately been warring, and with whom it was evident we should soon be once more engaged, speedily became as tranquil as any in our empire. Under his guidance a brigade of local troops was recruited from the peasants themselves, and when the second Sikh war occurred these men showed themselves worthy of the confidence Lawrence had placed in them by loyally acting against their own countrymen.

The second Sikh war, which broke out in 1848, resulted in the annexation of the Punjab, and in 1849 a board of administration, which comprised John Lawrence, his

brother Henry, and Mr. Mansel, was appointed to administer the annexed province. An onerous task devolved upon this board. The population of the extensive territory included warlike races bitterly hostile to the British power, and, as the dominant race, they tyrannized over the Mohammedans and the more peaceful of the population. Lawlessness prevailed on every hand, and misery was the normal condition of the people. Mr. Lawrence stepped in as champion of the oppressed, abolished barbarous Sikh laws, and promptly introduced the Indian criminal code. The country was thoroughly surveyed, the land settled upon a fair and equable basis, a local police was established, and a fine Punjab Irregular Force was organized for the protection of the north-western frontier. A disagreement arising between the brothers, Henry Lawrence was removed to Rajputana, and John remained, now chief-commissioner of the Punjab. Possessed of an iron frame, of indomitable courage, unbending will, and untiring energy, John Lawrence visited every part of his kingdom, which covered an area of about 50,000 square miles. The border tribes, who had been wont to descend from their mountain fastnesses and ravage the whole land between the Suliman range and the Indus, were made to feel that their reign of blood was over. Many of the clans settled in our districts, and while, previously, no one durst move near the border unaccompanied by a large escort, the frontier highway now became as safe as a British road.

On the outbreak of the Mutiny all eyes turned to the Punjab, our latest acquisition, and from their warlike nature and well-known antagonism to the British power, it was thought the Sikhs would take advantage of the opportunity to rise against us. The crisis showed more fully than ever the success of the splendid administrative abilities of the chief-commissioner. The Sikhs knew and trusted him, and chieftain after chieftain personally tendered his allegiance, and offered the use of his contingent. The offers were accepted, the Punjab Irregular Force was doubled, and while Lawrence held the province with an iron rule was at the same time able to pour down such an army to Delhi as enabled Archdale Wilson to stem the capital of the Great Mogul before a single reinforcement reached him from England. With the fall of Delhi the hopes of the mutineers were extinguished, and the pacification rather than the subjugation of India became the task of its rulers. Lawrence's services in the suppression of the mutiny entitled him to be regarded as the saviour of India, and he was created a baronet, while the directors of the East India Company granted him a life pension of £2000 a year. Returning to England he was made a member of the Privy Council and of the new Indian Council, and on the decease of Lord Elgin in 1863 he succeeded him as viceroy. At the close of his term of office in 1869, he was raised to the peerage as Baron Lawrence of the Punjab. In 1870 he was chosen as first chairman of the London School Board, a post he held till 1878. He died on the 27th of June, 1879, at the age of sixty-eight, and his body was interred in the nave of Westminster Abbey, beside Clyde, Ontram, and Livingstone. (See "Life of Lord Lawrence," by R. Bosworth Smith, M.A., London, 1885.)

LAWRENCE, SIR THOMAS, P.R.A., was born at Bristol, 14th May, 1769. His father was landlord of the Black Bear Inn at Devizes, and he commenced his career by drawing chalk likenesses of his father's customers. Madame D'Arblay (Fanny Burney) mentions the wonderful talents of this boy, which she unexpectedly discovered while staying at the inn. So precocious was his ability that at the early age of ten he set up as a portrait-painter in crayons at Oxford, and shortly afterwards his mother, now widowed, took a house at Bath that he might practise professionally. His success was extraordinary. In 1787 he settled in London, and in 1791 had so far distinguished himself as a portrait-painter, that, though still under the

legal age of twenty-four years, he was elected an associate of the Academy, and in the following year succeeded Sir Joshua Reynolds as painter to the king. In 1795 he was elected R.A. He seems to have fascinated people much in the same way that Guido Reni did in his early career, though he is far beneath the great Bolognese. Nevertheless, his portraits of women and children are often very beautiful. He was so skilful a flatterer that he never failed to give satisfaction. With men he was not very successful; his figures are generally out of drawing, though this is somewhat disguised by the style of the costume of the time. He was knighted by the prince regent in 1815, and at the death of West, in 1820, was unanimously elected president of the Academy. He died in London, 7th January, 1830.

LAWRENCE, ST., a martyr of the early Christian Church, who suffered at Rome in the persecutions under the Emperor Valerian, A.D. 258. He is said to have been roasted on a gridiron, and is represented in art with a gridiron in his hand. He is considered the patron saint of curiers. His day is celebrated on the 10th of August.

LAWRENCE, ST. (river). See CANADA.

LAWSONIA. See HENNA.

LAY FIGURE, a large wooden jointed doll-like figure upon which an artist may lay drapery, &c. (whence its name). This excessively useful adjunct to a painter's studio was invented by the monk-painter Fra Bartolommeo (1475-1517), the friend of Raffaele.

LAY VICAR, a character on the permanent establishment of a cathedral choir. In many cathedrals lay vicars form, and in all they used to form, a close corporation in connection with the body of the priest vicars; and in some cathedrals vicars-choral were always in priest's orders. Now, however, the title is an honorable distinction, carrying with it also certain privileges borne by a limited number of the chief chorists. The word *lay* is from the Greek *laos*, the people; that is, the people in general as distinguished from clerics.

LAY AMON is the earliest writer in English after the Conquest. For a century after England had fallen prostrate at the feet of the great Duke of Normandy, and had elected him king, such books as were written in England were in Latin, or falling that, in French. It was not till the reign of John that Layamon, the son of Eborath (called in a later text Lawman, son of Leuca) wrote the "Brit," a poem of 32,250 lines, an enlargement of Wace's "Brit" in Norman French, a poem of about half the length. Layamon was a priest at Embsay, near Bewdley, in Worcester-shire. He wrote into Wace's poem large excerpts from Bede and some lives of saints. As he says of himself, "Pen he took with fingers, and wrote on book-kin, and the true word set together, and compressed the three books into one." His poem was finished about 1205. We have two MSS. of it, one nearly contemporary, the other about twenty years later, and in the earlier there are not more than fifty Norman words, and of course several even of them may have come direct from the Latin. Taking the two MSS. together, there are ninety Norman words in over 56,000 lines. In its grammatical structure it is not only interesting, showing the gradual loss of the Old English (Anglo-Saxon) inflexions, and the beginning of that Middle English from which the tongue of Chaucer was to grow. The metre of Layamon is the old native alliterative verse of Old English in pairs of short lines,

each line carrying two accents, but a varying number of syllables. Two accents in the first line must begin with the letter of that pair, and one accent in the second line. Rhyme is used occasionally instead of alliteration, as well as assonance or vowel-rhyme; and the mixture appears in the following specimen of this inextinguishable relic. The author describes Arthur's coronation—

"Wha swa mihte iwenne
Wurthsclpe of his gomene
Iline me laddo midle songe
At foren than leod kinge;
And the king for his gomene
Gaf him geven gode."

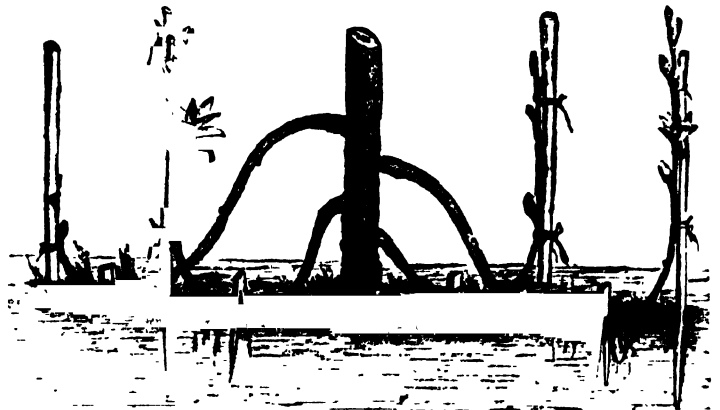
(Whoso might win | worship by his gaming, i.e. feats | him they led with song | before the people's king; | and the king for his gaming | gave him given goods, i.e. gifts.)

LAYBACH or **LAIBACH**, a city of Austria, in Illyria, in the province of Carniola, situated on a navigable river of the same name, 52 miles N.E. of Trieste and 78 miles S.W. of Gratz. It is built on uneven ground, and incloses a height in the centre, on the summit of which stands the old castle, now used as a state prison. The streets are narrow and irregular, but the houses are tolerably well built. The principal buildings are the castle, cathedral, and other churches, the bishop's palace, the town-hall, a handsome Gothic building; the masquerade hall, theatre, barracks, &c. Its manufactures consist chiefly of stuffs and linen fabrics, but its silk and woollen manufactures have greatly fallen off. It also has several oil and paper mills, tanneries, and sugar refineries, and a considerable trade by Trieste. Population, 25,000.

Laybach is the ancient *Enona* or *Omoma* which was destroyed by Attila in 452, but having been restored, is said to have been enlarged and fortified by Narses. It is celebrated in diplomatic history for the congress held here in 1821.

LAYERING is an operation by which the propagation of plants is effected by laying down or bending the shoots

Fig. 1.



Layering.

so that a portion of them can be covered with earth. A shoot so operated on is called a *layer*, and the plant which furnishes the layer bears the name of *stock*.

The part of the shoot intended to form a layer should be divested of leaves where it is to be covered with the mould, and a slit should be made on the bent part, or the branch should be twisted half round at the bend so as to disarrange the woody tissue, or the bark should be half or three-quarters *ringed*. The shoot is then fixed down by pegs or hooked sticks (see fig. 1) cut down to within an inch or so of the ground, and covered with good mould,

which must afterwards be kept tolerably moist. In general roots are emitted in a few weeks, and by the end of a season young plants are obtained quite fit for transplantation. Some plants, however, require to be left for two years on the stools before they are removed, and there are some which can hardly be made to root at all in this manner. When the branches cannot be bent down a flower-

Fig. 2.



Layering by Elevation.

pot is fixed on the branch, so as to keep moist soil round it (see fig. 2). Adventitious roots are soon pushed out, and the branch may then be severed and planted out.

LE or **LEH**, a city in Central Asia, the capital of **LAPAKH**, situated in the valley of the Upper Indus, at the foot and on the slope of some low hills on the N. side of the river, from which it is separated by a sandy plain 3 miles broad, 150 miles S.E. of Iskardo, and 930 miles N.W. by W. of Lassa. The city contains about 1000 houses, each several storeys high and substantially built. The population is about 4000. There are several bazaars, each containing from twelve to fourteen shops. Le is a place of great trade, being the principal entrepot of Tibet for the shawl wool, and three great fairs are annually held here, at which merchants attend from China, Tibet, the Punjab, and Cashmere. It has several temples, and the palace of the rajah is of great size, though rudely finished.

LE JEUNE, CLAUDE, a musical composer of the great Netherlands school, was born at Valenciennes in 1530. He took the Huguenot side in the conflict of religions, and suffered much privation in consequence. But when Henry IV. came to the crown, and showed ample toleration to those whose religion he himself had once professed, Le Jeune saw better days. His great work is the setting of the Psalms versified by Marot and Beza, a collection which spread with fiery rapidity all over Europe wherever Calvinists were to be found. Most critics consider Le Jeune's tunes better than Goudimel's. The melodies are simple, fit for congregational use, and often even to modern ears very beautiful. He was long credited with the authorship of "Old Hundred," but doubt has lately been cast upon this tradition. Le Jeune died about 1600.

LE SAGE; LE SUEUR. See **LESAGE; LESUEUR**.

LEA RIVER. See **ESSEX; HEITFORD**.

LEAD is a metal of a bluish-gray colour, and of considerable brilliancy when fresh surfaces are formed by cutting. If it has not been cooled too rapidly, it is so soft that, even when in pieces of considerable thickness, it may be easily bent. It soils slightly, and leaves on paper or cloth a mark after friction resembling that of plumbago. Its specific gravity is 11.4. The chemical symbol for lead is Pb, and its equivalent is 206.4. Lead may be reduced to thin laminae; but its tenacity is extremely slight, so that a wire about one-tenth of an inch in diameter breaks with a weight of 30 lbs. It fuses at 325° C. (615° Fahr.), and when slowly cooled crystallizes in octahedrons. It is not a volatile metal, for in close vessels it may be heated to whiteness without subliming. When exposed to the air it absorbs oxygen and carbonic acid slowly, and acquires a superficial coating of carbonate of lead. If it be exposed to air and water, it is oxidized and converted into carbonate of lead with considerable rapidity; this carbonate has the appearance of minute shining brilliant scales. Though at common temperatures lead is slowly acted upon by the oxygen of the air, it is readily oxidized when the heat is raised. It is a bad conductor of heat and electricity.

Native Lead.—This is of very rare occurrence; it is found in small globular masses, imbedded in galena, or sulphuret of lead, and a sluggy substance, accompanied with blende and crystals of quartz. *Protocath of Lead, Native Massicot*, occurs in brittle, dull, opaque, yellowish masses, which melt readily by the blowpipe. *Deutocath of Lead, Native Red Lead, Native Minium*, is a dull red earthy substance, which is reduced to the metallic state by the blowpipe. *Chloride of Lead, Columia, Cotunnite*, occurs in small pearly crystals, which are easily fusible and soluble. *Dichloride of Lead, Berzelite*, occurs in crystalline masses, with a fibrous and radiated structure, on earthy black ore of manganese. *Sulphide of Lead, or Galena*: this almost universally diffused ore occurs in attached crystals and massive. Primary form, the cube. The crystals are opaque and leaden gray. The massive varieties have a granular structure. By the blowpipe on charcoal the sulphur is first dissipated, and then metallic lead is obtained. In Cornwall and Scotland the veins of this ore traverse primary rocks. In Derbyshire it occurs in veins or beds in transition rocks. It very commonly contains silver. *Selenide of Lead* occurs in granular masses, opaque, and of a bluish lead colour.

Carbonate of Lead occurs crystallized and massive. Primary form, a right rhombic prism, brittle, grayish colour, and translucent. It occurs in most lead mines, and is sometimes used as an ore of lead. *Sulphate of Lead* occurs in right rhombic prisms, variously tinted, and translucent. *Phosphate of Lead, Pyromorphite*, commonly occurs in hexagonal prisms, variously coloured, resinous lustre, and translucent. *Arseniate of Lead, Gordanite*, occurs in hexagonal prismatic crystals, yel-

lowish and translucent. *Chromate of Lead* is a rhombic prismatic crystal, reddish coloured, and translucent. *Molybdate of Lead*, or *Carinthite*, is a prismatic crystal of various colours, translucent, and having a resinous lustre. *Tungstate of Lead* is a prismatic crystal, with a conchoidal fracture, a yellowish colour, a resinous lustre, and translucent. *Vanadate of Lead*, or *Johnstonite*, occurs in rhomboidal crystals, brittle, yellowish, and opaque.

There are five oxides of lead. The *suboxide* (Pb_2O) is a black powder which does not combine with acids. The *protoxide* (PbO) occurs native as lead ochre. The manufactured product is called *Massicot* or *Litharge*, and is obtained by oxidizing melted lead in the air; it occurs in shining yellow scales. It is soluble in potash and soda, and combines readily with acids, forming very soluble salts. The *red oxide* (Pb_3O_4) is known as *Minium* or *Red Lead*, and is largely manufactured for use in painting ironwork; it is a scarlet crystalline powder, and is made from litharge by continued heating in the air. It is also found native. The *sesquioxide* (Pb_2O_3) is an amorphous reddish-yellow powder. The *peroxide* or *binoxide* (PbO_2) is called *Brown* or *Puce Lead*; it is also found native, and known as *Plattnerite*. It is a brown powder which does not combine readily with acids, and is easily reduced to the protoxide, giving off oxygen; it is a valuable oxidizing agent.

Chloride of Lead is a colourless, somewhat crystalline powder, which melts by the application of heat, and assumes on cooling a hoary appearance, whence it was formerly called *Horn Lead*. It is sparingly soluble in water, and consists of $PbCl_2$. *Oribichloride of Lead* (Pb_2Cl_3O) is used as a pigment instead of white lead. *Sulphide of Lead* may be formed by melting a mixture of sulphur and lead together; in appearance it very much resembles lead, and is composed of PbS . *Iodide of Lead* (PbI_2) is a yellow powder, sparingly soluble in boiling water, and separates, on cooling, in brilliant flakes. *Carbonate of Lead* is very largely employed as a pigment under the name of *White Lead* or *Ceruse*, from the Latin name *Cerussa*. Various processes are adopted for its preparation; the oldest (which is still preferred by many manufacturers) is that of exposing sheet lead to the action of the vapour of vinegar, in earthen pots, heated by tanners' spent bark. It is a dense white powder. *Nitrate of Lead* is a colourless solution, which by evaporation yields colourless octahedral crystals. They decompose when heated moderately, and if strongly heated they are decomposed. *Sulphate of Lead* is a dense white substance, insoluble in water. *Phosphate of Lead* is also a white insoluble powder; but, unlike the sulphate, it dissolves readily in dilute nitric acid. *Acetate of Lead*, frequently called *Sugar of Lead*, is very largely employed for various purposes. It is prepared by dissolving litharge in acetic acid, and evaporating the solution to its crystallizing point. The crystals are generally minute and prismatic; they are colourless, nearly odorless, and have a sweetish astringent taste. When this salt is boiled in water with an equivalent of oxide of lead, acetate of lead is formed, which is used in medicine under the name of *Goulard's Extract of Lead* as a cooling lotion. *Chromate of Lead* is largely employed as a pigment. It is of a beautiful yellow colour.

Of the alloys of lead, three are of some importance. Alloyed with antimony, lead forms *Type metal*; *Potter* consists of about 80 parts tin and 20 lead. Equal parts of tin and lead form *Plumber's Solder*.

History, Manufacture, and Trade.—Lead was known to and used by the Greeks and Romans for various purposes. Among others it was employed for pipes to convey water, just as it is now. The lead mines of this island were worked by the Romans. The chief of them are in Cornwall, Devonshire, Somersetshire, Derbyshire, Durham, Lancashire, Cumberland, Westmorland, Shropshire, Flint-

shire, Denbighshire, Merionethshire, and Montgomeryshire; in Scotland, in Dumfriesshire, Lanarkshire, Ayrshire, and Argyllshire. Lead is also found in Ireland, in the counties of Armagh, Wexford, Wicklow, Waterford, Clare, and Down.

The ore of lead, when extracted from the mine, is called *Galena*, and is combined with various earthly matters. The first processes subsequent to its extraction are those of crushing or pounding and washing the ore. The ore is then smelted, sometimes in a common smelting furnace and sometimes in a reverberatory furnace; and the melted metal is allowed to run into a large iron pan, from which it is ladled into cast-iron moulds. It then constitutes what is called *Pig Lead*. In this state lead always contains more or less of silver. The proportion is sometimes exceedingly minute, varying from 1 to 30 ounces in a ton of lead. The extraction of the silver is always performed when it exists in a proportion sufficient to pay the expense of the process, which varies in different localities according to the cost of fuel. The process of extraction, which is called *refining*, depends upon the well-known circumstance that lead, when heated to redness, absorbs a large portion of oxygen from the air, and is converted into an oxide, while silver does not undergo any such change, but retains its metallic form at almost any temperature. Mr. Pattinson, of Newcastle, has introduced an improved process, in which the crystallizing properties of melted lead are brought into requisition. Another method more recently introduced is the extraction of the silver by melting the lead with zinc, which combines with the silver, the alloy floating on the surface of the lead; from this alloy the zinc is distilled off, leaving the pure silver.

The most extensive use of lead is in the form of sheets, and pipes or tubes for the passage of liquids. To make sheet lead, the pigs are brought to a state of fusion in a large pot or cistern, near to which is placed the table on which the sheet is to be cast. This table, which is usually from 18 to 20 feet long and 6 feet wide, is made either of wood or cast iron. The wooden table has its surface protected by a layer of fine sand, which is wetted and spread evenly and firmly over it before the melted lead is poured on. To prevent the lead from running over the sides, a ledge is provided, 2 or 3 inches thick and 2 inches high, which forms the margin of the table. An instrument called a *strike* is also provided to regulate the thickness of the sheet, and to spread the melted metal evenly over the table. In casting the sheet the fused metal is taken from the cistern with an iron ladle, and put into a triangular-shaped shovel or peel, placed at the head of the table, which peel being raised so as to pour out the lead upon the table, the strike is brought into use to spread it evenly over the whole surface, the surplus, if any, falling into a vessel placed for its reception at the foot of the table. A sheet of lead weighs 9 cwt., so that its length and breadth will be greater in proportion to the diminution of its thickness. The thickness of sheets of lead is frequently reduced by means of heavy rollers worked by steam power. Rolled sheet lead is made by the repeated compression between steel rollers of a block of lead several inches in thickness.

Lead pipes are sometimes made, when great exactness of shape is not required, by bending a length of sheet lead of the necessary width over a mandril, and soldering the edges together; but the more usual method of manufacture is by casting and drawing. The casting-box employed is an iron cylinder made in two parts, and put together longitudinally with flanges; inside of this cylinder is placed an iron rod or core, which is so fixed as to be concentric to the cylinder, without touching it; a space is thus left, into which the melted lead is poured. When this is set the core is removed and the cylinder opened so as to withdraw the pipe, which is much thicker than is needed, and

must be lengthened, while its substance is reduced, by drawing it through a succession of holes in steel plates, diminishing gradually in diameter.

In the making of lead shot, the lead is alloyed with a small portion of arsenic, and is melted in a furnace. Close to the furnace is placed a large colander, or perforated plate, into which a portion of the scoria produced in melting the metal is placed, and then the metal is ladled into it. Being somewhat detained by the scoria, it is partially cooled and divided into separate portions, which pass through the colander in the form of globules, which follow in such rapid succession as to have the appearance, to a cursory observer, of a continued stream. These globules fall into a tub of water placed on the lower floor of a lofty tower, or at the bottom of a deep pit. The shot thus formed are of various sizes, and a small proportion are imperfect as regards sphericity. Having been perfectly dried by artificial heat, the shot are sorted according to their sizes by means of a series of sieves, the meshes of which have different degrees of fineness; and the imperfect shot are separated from the perfect by allowing the whole to roll down an inclined plane. The spherical shot are propelled into a receptacle more distant from the inclined plane than those of imperfect form are able to reach. The shot thus sorted are then polished by rolling about half a ton together in an iron barrel which that quantity nearly fills.

A large quantity of the lead produced and manufactured in the United Kingdom is annually exported to foreign countries, principally to Germany, France, Austria, India, China, Hong Kong, Russia, United States, and Brazil. On the other hand, there are extensive imports of sheet and pig lead, chiefly from Spain and Italy.

The number of lead mines in the United Kingdom in 1885 was 310, of which only three are in Scotland and two in Ireland. The annual yield of lead ore is about 65,000 tons, which produces 50,000 tons of lead and nearly 350,000 oz. of silver. The total value of the lead and silver produced is nearly £600,000 per annum. The imports of lead into the United Kingdom in 1884 amounted to 109,014 tons, value £1,221,000; and the exports of lead and lead manufactures to 33,539 tons, value £121,990.

The sales and purchases of lead ores are technically called "ticketings." The mine-owners and lead smelters are generally distinct firms. In some districts the mine-owners give notice to the smelters that parcels of ore are ready for sale; samples are taken by the smelters to their assay rooms; an auction is afterwards held, at which the several parcels are knocked down to the highest bidders. In other districts each mine-owner sends samples to all the smelters, who forward sealed tenders, and each parcel goes to the highest tender.

Action of Lead on the Human System.—In a purely metallic state, lead produces no action on the human system except such as arises from its mechanical properties; but as soon as it becomes oxidized, it can combine with the contents of the stomach, and produce different effects, according to the nature of the substances it meets with. In whatever form lead is habitually applied to the body, it is apt to bring on the train of peculiar symptoms; the inhalation of its fumes, the habitual contact of any of its compounds with the skin, the prolonged use of them internally as medicines, or externally as ointments and lotions, and the accidental introduction of them for a length of time with the food, may, sooner or later, equally induce *Colica Pictorum*, or Painter's Colic. Of all exposures none is more rapid or certain than breathing the vapours or dust of the preparations of lead." (Christison.) The action of lead on the human frame differs greatly according to the kind of preparation of lead, the quantity employed, the length of time or frequency of exposure to it, and the chan-

nel of its introduction into the body. "One class of symptoms indicates inflammation of the alimentary canal; another, spasm of its muscles; and a third, injury of the nervous system, sometimes apoplexy, more commonly palsy, and that almost always partial and incomplete. Each of these classes of symptoms may exist independently of the other two; but the last two are more commonly combined." (Christison.) Fatal cases from poisoning by large quantities of the salts of lead are not numerous, as there is in general time to administer antidotes; but death from the slow and insidious introduction of lead into the system is of frequent occurrence. The principal source of these is the use of water or other fluids containing lead in solution; and to prevent the numerous serious and frequently fatal consequences which have followed the use of lead pipes for conveying water into houses, in 1868 an invention was made by MM. Hannon and Lebetron-Brun, by which the danger is entirely obviated. A tin tube is inclosed within the leaden one, and the two are drawn out by hydraulic power. The *inside* of the compound tube has therefore a tin in place of a leaden surface, and as tin is unacted on by air and water, all risk of poisoning is by this means effectually prevented.

No kind of adulteration or impregnation with lead, from accident or ignorance is more common than that of wine or cider. Even a single shot of lead left by accident in a bottle after cleaning has produced severe colic. Lead tanks which contain distilled water or pure lake or river water often contaminate it, and give rise to symptoms of lead poisoning.

In small medicinal doses acetate of lead acts as a sedative and astringent. It manifests its sedative effect even when applied externally, and lessens discharges from ulcers, though its application to these is not always safe. Even white lead (carbonate of lead) ointment applied to ulcers has proved fatal.

Medicinal Uses of Lead.—The principal preparations of lead used in medicine are the acetate, sub-acetate, and oxide. The acetate or *sugar* of lead is made on a large scale from litharge, and occurs as a white spongy-looking mass composed of brilliant but minute aced-shaped crystals having a sweetish taste. It dissolves in water, forming a clear or slightly milky fluid. From its astringent properties it is, when taken internally, exceedingly useful in checking bleeding from all parts of the body, but more especially from the lungs and stomach. It is also a valuable remedy in phthisis, to check expectoration; in bronchitis, to abate profuse secretion; and is useful in all forms of diarrhoea, but more especially the chronic form of the disease. In dysentery and typhoid fever the acetate of lead will often succeed in arresting the purging, and in combination with opium it has a good reputation for the treatment of cholera. Externally it is used for its sedative and astringent effects, and in the form of a lotion for diminishing morbid mucous discharges. The sub-acetate of lead is a dense clear liquid, destitute of colour, and of a sweet astringent taste. Goodland water is a dilute solution of sub-acetate of lead, and as a cooling, soothing, and astringent application it is more frequently used than the acetate. It is generally applied by means of cloths, which should be frequently wetted with the liquor. It is suitable only for external application, and taken internally is a poison. The oxide of lead or litharge, consisting of heavy orange-red scales, is never administered internally, but it is largely used for the preparation of plaster. To make the simple lead or "diachylon" plaster, litharge is boiled for some hours in olive oil and water, until a thick tenacious paste is formed, which is then spread upon calico. For the ordinary sticking plaster a little resin and soap are added, and the same ingredients, though in different proportions, are used to make "scap plaster."

LEAD, BLACK. See PLUMBAGO

LEAD ORES. Those of commercial importance are almost exclusively confined to the minerals galena, anglesite, and cerussite, the two latter being probably derived from the former, and most usually associated with it.

Galena is the sulphide of lead (PbS), containing 86.6 per cent. of the metal. It has a specific gravity of about 7.5, and occurs in cubes of a lead-gray colour and high metallic lustre.

Anglesite is the sulphate of lead ($PbSO_4$), and in most instances is formed by the oxidation of galena. It contains 68.3 per cent. of lead, has a specific gravity a little over 6, is generally white but liable to be coloured by other minerals. It is very easily fusible. This ore is mostly obtained from Australia.

Cerussite is the carbonate of lead ($PbCO_3$), and contains 77.5 of the metal. It has a specific gravity of about 6.5, and is of a white colour when pure.

Metallic lead can be obtained from these minerals by reduction on charcoal with soda before the blowpipe; the lead is sectile, malleable, and easily soluble in acetic acid. The ores can generally be distinguished from each other by their physical characters. Cerussite dissolves in acid with effervescence; anglesite gives a sulphur reaction.

Other minerals, compounds of lead, but seldom occurring in quantity, are, the red oxide *minium* (Pb_3O_4); *paramorphite* or green lead ore, the phosphate and chloride; *crocoisite*, the chromate ($PbCrO_4$); and *wulfenite*, the molybdate ($PbMoO_4$); besides some others of greater rarity.

The chief lead mines of Great Britain are in Cornwall, Devonshire, Somersetshire, Derbyshire, Durham, Lancashire, Cumberland, Westmoreland, Shropshire, Flintshire, Denbighshire, Merionethshire, and Montgomeryshire; in Scotland, in Dumfriesshire, Lanarkshire, Ayrshire, and Argyllshire. Lead is also found in Ireland, in the counties of Armagh, Wexford, Wicklow, Waterford, Clane, and Down.

LEAD PLASTER, which is largely used in medicine as an external application and as a basis of other plasters, is a lead soap of a fatty acid, and is usually made by boiling lard with olive oil; it is an oleate of lead. A crude lead soap has been patented for greasing the axles of railway carriages.

LEAD POISONING. Pure metallic lead, so far as is known, has no injurious effect upon the human system, but owing to the fact that it readily oxidizes and forms salts, all of which exercise a deleterious influence, lead poisoning is by no means an infrequent form of disease. As might be expected it is most frequently met with among workmen whose occupations bring them habitually into contact with preparations of lead. Painters who use white lead in the preparation of their colours so frequently become victims to this affection that it is often known as "painter's colic." The workmen employed in lead works, lead mines, paint grinders, card glazers, plumbers, type foundries, and compositors, also frequently suffer from lead poisoning, but it is not by any means confined to those whose occupation brings them into contact with lead, for there are so many ways in which it may be introduced into the system that persons in all ranks of life are liable to become victims. Thus drinking water which has been kept in leaden cisterns or brought in leaden pipes is often a potent source of mischief. Some waters, indeed, have little or no effect upon lead, and pass through it without contracting impurity, or by their action they form an insoluble coating on the inside of the pipe or vessel, and so prevent mischief; but there are others in which the action is very rapid. The Loch Katrine water supplied to Glasgow is very deficient in lime salts, and it cannot be safely carried in lead pipes, as its action upon them is very powerful. Articles of food packed in lead foil may be means of conveying the poison, while the salts of lead are sometimes actually used in the preparation of food or luxuries. Snuff has sometimes been coloured by means of powdered red lead, and it often

enters largely into the composition of hair dyes, face powders, and cosmetics. Formerly chronic lead poisoning was so common in Devonshire, that it was termed there *Devonshire colic*, and it was also so extensively prevalent among the inhabitants of Picton as to be known as *Colica Pictonum*. In the former place it arose from the action of the apple juice on the lead used in forming the cider presses, while in France preparations of lead were used to prevent the wines from turning sour. The symptoms of lead poisoning are usually marked by the development of a pale, dull, earthy hue upon the skin, disordered digestion, dryness and the presence of a sweetish taste in the mouth, a furred tongue, and disagreeable breath. The most obvious sign, however, is the presence of a bluish or violet line at the edges of the gums just where they meet the teeth. It is seen on the gums only where they come in contact with the teeth, and where there are no teeth the line is absent. This, which is regarded as the specific diagnostic indication of lead poisoning, is due to the formation of a lead sulphide in the parts. Following the symptoms just described there occur attacks of a very painful character—the lead colic. In this the bowels are obstinately confined, there is a feeling of nausea and occasionally vomiting, and severe pain is felt in the walls of the abdomen, chiefly in the region of the navel. Sometimes the pain is relieved by pressure, but at others it is increased, and it is usually attended by pains in the joints and cramps in the legs and other parts of the body. The urine is not unfrequently almost wholly suppressed. There is usually an anxious expression of countenance, and the skin is covered with cold perspiration.

A still more serious effect of lead poisoning is that known as lead palsy. It sometimes appears after repeated attacks of lead colic, but sometimes after only one, or without any. There is a wasting of the muscles, those of the forearm being the first to suffer—those, that is, which lift the back of the hand—so that if an attempt is made to lift the hand that way, the wrist drops. By and by the muscles of the upper arm also fail, and even those which are attached to the shoulder blade may waste and become useless. In more advanced cases the brain is seriously affected, and epilepsy and insanity may ensue. Women employed at white-lead works are frequent sufferers from these maladies, and there are others not mentioned which specially affect those who are married. With respect to the treatment of lead poisoning, the first thing to be done is to stop the introduction of lead into the system. Workmen who, from the nature of their occupation, are brought into injurious contact with lead should practise the most scrupulous cleanliness, avoid eating with unwashed hands, or in working clothes, or where the work is going on. The works, if possible, should be freely ventilated, and where the raising of lead dust is unavoidable, flannel respirators should be worn. Occasional doses of sulphate of magnesia acidulated with sulphuric acid should be taken, and some form of drink containing sulphuric acid should be habitually used. In many large lead works the men are supplied with treacle beer acidulated with sulphuric acid, and its use is found very beneficial. In the treatment of lead colic good doses of sulphate of magnesia, combined with opium to allay the pain, are called for, and the hot bath and repeated enemata of hot water are also serviceable. After the bowels have been freely moved iodide of potassium must be given to remove the lead from the system, and this process may be greatly assisted by the use of sulphur baths, which should be repeated until they cease to cause any discolouration of the skin. For lead palsy, in addition to the general treatment designed to eliminate the lead from the system, galvanism in the form of Faradization is of great service as a local stimulant to the nerves of the parts affected. The treatment of lead rheumatism is much the same as the foregoing.

LEADHILLS, a mining village of Scotland, in the county of Lanark, near the summit level between two valleys bounded by high heath-covered hills 2450 feet in height, 86 miles S.E. of Glasgow, and 46 miles S.W. of Edinburgh. It is 358 miles from London, being 5 miles from the Elvanfoot station of the Caledonian Railway. Its height above the sea is from 1300 to 1400 feet, the village being the highest in Great Britain. There are four principal veins of lead ore, from 4 to 10 feet thick; in one place the pure ore was 14 feet thick. One vein is wrought to the depth of 140 fathoms. The poet Allan Ramsay, whose father was manager of the mines, was born here, 15th October, 1686. The population of the village in 1881 was 1023; of the *quoad sacra* parish, 1081.

LEADING NOTE, in music, the seventh degree of the scale. It is half a tone below the keynote, and owes its name to the irresistible way in which the ear is led on to proceed to the keynote after hearing the leading note. The French call it *la note sensible*, the Germans *der leitton*. Owing to its immoderate use when its power was first discovered in harmony, Pope John XXII. in 1322 named it in a papal edict as deserving the censure of the church.

LEAD-LINE. Ships are said to be in *soundings* when the sea-bottom can be reached by a weight lowered from a ship with a line attached. This is called "heaving the lead." Lead-lines are carried by every ship or vessel afloat, and are either called *hand lines* or *deep-sea lines*. The hand-lead weighs about 7 lbs., and its line varies in length from 20 to 40 fathoms. The lower part of the lead is scooped out and filled with tallow, to which loose substances at the bottom adhere, and show the nature of the bed of the sea; this alone frequently acquaints a mariner with his ship's position. The deep-sea lead weighs from 25 to 35 lbs., and is attached to a line of far greater length.

LEAF is a plant-structure which rises from the stem or its branches, below the growing-points. The leaf consists in general of two parts, the flat portion or "blade," and the stalk or "petiole." There are additional portions in several leaves, e. g. the rose, at the base of the petiole, which are called the "stipules." If the petiole is wanting, the leaf is said to be *sessile*. Roots are destitute of leaves, and many so-called roots are in fact creeping under-ground stems (or rhizomes), and may be recognized as such by their scale-like leaves.

Phyllotaxis, or arrangement of leaves on the stem, differs for different kinds of plants, but is regular for different individuals of the same plant. In the elm and lime, for instance, and also in the extensive family of grasses, the leaves are on opposite sides of the stem at different heights; so that, beginning to count from a certain one, the third, fifth, seventh, are directly over it, while the fourth and sixth are over the second. In the birch, alder, and the family of sedges, the second leaf is a third of the way round the stem, the third another third, and the fourth directly over the one from which we started. In the apple-tree, oak, and many other plants, a spiral drawn round the stem from one leaf-insetion to another passes twice round the stem before we come to one which is directly over the first. In the holly the spiral makes three revolutions, and it is the ninth which begins the new series. These various relations are expressed by means of fractions, in which the numerator expresses the number of turns taken by the spiral in each series, and the denominator the number of leaves. Thus, $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, $\frac{4}{5}$ respectively represent the arrangements mentioned above. Some leaves are directly opposite one another on the same level, and others again occur in whorls.

The bundles of fibres, long cells, and vessels (the fibro-vascular bundles) of the stem pass up into the leaf and spread out, forming the ribs and veins, which are clearly seen in a skeleton-leaf. The intervening

portions consist of a tissue of simple cells, the whole covered with cells forming the skin or *epidermis*. Some of the epidermal cells form *stomata* or "breathing pores," leading into intercellular passages.

Venation, or the way in which the veins of the leaf are arranged, is an important element in classification; for, as a general rule, plants belonging to the great class of *MONOCOTYLEDONS* have the veins of their leaves running more or less parallel from base to apex, whereas the leaves of *DICOTYLEDONS* have a net-like (*reticulate*) arrangement of the veins. Leaves with reticulate venation are feather-veined (*penni-nerred*), as Plate I., figs. 5, 18; or *palmi-nerred*, as Plate I., figs. 19-21.

The form of leaves is useful in the discrimination of species. They may be lance-shaped (*lanceolate*, Plate I., figs. 2, 3; *linear*, with edges parallel; *linear-lanceolate*, intermediate these last, as Plate I., fig. 1; *ovate*, Plate I., figs. 4, 5; *obovate* (leaflets), Plate II., figs. 3, 4; *rotundate*, Plate I., fig. 6; *ensiform* (sword-shaped), Plate I., fig. 7; *oblong*, Plate I., fig. 8; *spathulate*, Plate I., fig. 10; *reniform* (kidney-shaped), Plate I., fig. 11; *triangular*, Plate I., fig. 12.

The base of the leaf is described as acute (Plate I., fig. 2), cordate (Plate I., fig. 9), hastate (Plate I., fig. 12), sagittate (Plate I., figs. 13, 15), oblique (Plate I., fig. 16), auriculate (when a sagittate leaf is sessile), amplexicaul (when a sessile leaf clasps the stem without inclosing it), perfoliate (when the lobes of an amplexicaul leaf are joined on the other side, Plate I., fig. 23). The leaf is said to be petiole when the stalk appears to spring from the back of the leaf (Plate I., fig. 24). When the bases of two opposite leaves are joined, they are said to be connate. When the leaf runs down the stem, forming ridges, it is called decurrent.

The apex is acute (Plate I., fig. 3) or acuminate (Plate I., fig. 4), obtuse (Plate I., fig. 5), obovate (leaflets in Plate II., fig. 3), emarginate (with the notch not so deep), retuse (with a smaller notch), mucronate (when the midrib projects, Plate II., fig. 1).

The margin may be entire (Plate I., fig. 2), repand or wavy (Plate I., figs. 6, 10), serrate (Plate I., fig. 3, when the teeth point towards the apex), dentate (when they point outwards, as in holly), crenate (when they are rounded, Plate I., fig. 21), lobed (Plate I., figs. 17-22, 25, Plate II., figs. 1, 2, 5, 7), erate (emarginated with hairs, Plate II., fig. 12). Lobed leaves may be described according to the number of the lobes, as bi-lobed (Plate II., fig. 1), tri-lobed (Plate I., fig. 19, Plate II., fig. 2), six lobed (Plate II., fig. 5). The lobes may be rounded (as in Plate I., fig. 17), or acute (as in Plate II., fig. 2).

When the lobes follow the penni-nerred type the prefix *pinnati-* is used, and when of the palmi-nerred type, the prefix *palmi-* is used; and to these prefixes are added suffixes, either *-fid* (left), to show that the lobes are not deeply cut, or *-partite*, to show that the cutting extends nearly to the midrib, or *-sect*, that the lobes are only connected by a narrow strip of parenchyma. Thus the leaves (Plate I., figs. 17, 18) are pinnati-fid, the leaf (Plate I., fig. 25) is pinnati-partite, and the leaf (Plate I., fig. 22) is pinnati-sect; the leaves (Plate I., figs. 19, 20; Plate II., figs. 2, 5) are palmi-partite, and the leaf (Plate II., fig. 7) is palmi-sect. The lobes themselves may be described as serrate (Plate I., fig. 17), sinuate (Plate I., fig. 18), lobed (Plate I., fig. 21); when the lobes are much cut, as in Plate I., fig. 22, the leaf is said to be lacinate. When no connection by means of parenchyma can be traced between the parts of a leaf it is called *compound*, and the parts are *leaflets*. When the leaflets are arranged in the penni-nerred mode, the leaf is *pinnate*; if with an odd leaflet at the apex, it is *impari pinnate*.

(unequally-pinnate), as in Plate II., figs. 6, 10; if there is an equal number, the leaf is *pari-pinnate* (equally-pinnate), as in Plate II., fig. 8. The leaf (Plate II., fig. 3) is *tri-foliate*, and the leaflets are *ternate*. When the leaflets are not exactly opposite, the leaf is *alterni-pinnate* (Plate II., fig. 11), and if smaller ones intervene (as in Plate II., fig. 10), the leaf is said to be *interruptedly-pinnate*. When the petiole bears other stalks pinnately, on which leaflets are also arranged pinnately (as in Plate II., fig. 11), the leaf is *bi-pinnate*; and in the same way if the secondary petioles bear stalks with pinnate leaflets, the leaf is *tri-pinnate* (Plate II., fig. 12). It is often difficult to say whether a leaf is actually *bi-pinnate*, and this is especially the case among ferns, which are extremely variable. The leaflets of flowering plants are called *pinnæ*, and their subdivisions *lobes*; but in describing ferns we speak of *pinnæ*, of their subdivisions as *pinnules*, and the subdivisions of these as *lobes* (see Plate II., fig. 15).

The *pinnæ* are described in the same way as simple leaves, e.g. as *pinnati partite* (in Plate II., fig. 9), *lacinate* (fig. 13), *finely serrate* (figs. 2, 5), *coarsely serrate* (fig. 10).

Various terms are used in speaking of the *surface* of leaves, which may be *glabrous* (destitute of hairs) or *pilose* (with soft, scattered, short hairs), *pubescent* (densely pilose), *villose* (densely covered with long soft hairs), *tomentose* (velvety), *hispid* (with long stiff hairs), *scabrous* (rough). Leaves are called *coriaceous* if tough and leathery, and *herbaceous* if soft and green.

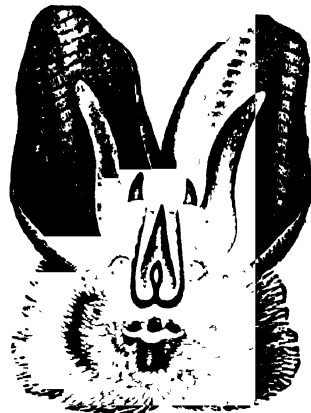
The *structure* of leaves is wonderfully adapted to the functions which they perform, namely, feeding and evaporating. The roots take up great quantities of water containing mineral matter in solution. The mineral substance is used up in various ways in the growth of the plant, while the greater portion of the water which has been of so much use in carrying the mineral food through the plant, is got rid of by passing away as vapour through the stomata of the leaves. Air is also admitted through these "breathing-pores," and the carbonic acid is broken up into its components—oxygen and carbon. Most of the oxygen passes out again, but the carbon is combined with other substances, such as water and nitrogen, to form material wherewith to build up the plant. The assimilation of carbon only takes place in the green cells beneath the epidermis, and only in sunlight.

The *fall* of the leaf is a process which is continually going on in tropical countries, and with our evergreen trees. But the great majority of the trees of temperate climates shed the whole of their leaves in the autumn, and hence they are called *deciduous*. The cells become at length clogged with substances which cannot be used as food, and interfere with the natural processes. The protoplasm passes into the stem, leaving behind red and yellow sap and crystals, which produce the brilliant colouring of the autumnal foliage. A layer of thin-walled cells has generally been forming through the summer across the base of the stalk, and when this is complete the leaf is full of wind is sufficient to detach the leaf from the stem. Parasites, like the broomrape, get all their nourishment from their hosts, and therefore their leaves are reduced to small brown scales; the Dodder has no leaves. The leaves of a few plants are adapted to catch small flying creatures, such as insects, and are therefore called *insect-trap-plants*.

Plate III. contains figures of several forms of these abnormal leaves. Fig. 1 is a leaf of Sundew (*Drosera rotundifolia*), enlarged three times. Fig. 2 is Venus' Fly-trap (*Dionaea muscipula*), natural size. These plants are described under INSECTIVOROUS PLANTS. Fig. 3 is one of the Pitcher Plants (*Darlingtonia californica*), one-fourth the natural size; fig. 4 is another (*Heliamphora nutans*), one-half natural size. Fig. 5 is the

Australian Pitcher Plant (*Cephalotus follicularis*), natural size; fig. 6 is the common form *Nepenthes bicalcarata*. These figures are noticed under PITCHER PLANTS. Fig. 7 is a representation, enlarged seven times, of three bladders of *Utricularia vulgaris* (Bladder-wort); one (b) of the bladders is cut in order to show the valve, and another (a) represents how the young fry of roach have been observed to be caught. Fig. 8 is the common Butterwort (*Pinguicula vulgaris*), reduced one-half, with the flower-stalk broken off; fig. 8a is a detached leaf with a row of flies caught under the margin of the leaf. Figs. 7 and 8 are described more fully under INSECTIVOROUS PLANTS. Fig. 9 is *Gentlesea*, a being one of the ordinary leaves, and b a altered leaves, described under PITCHER PLANTS.

LEAF-BAT (*Megaderma*) is a genus of bats belonging to the family NYCTERIDÆ, remarkable for the extraordinary development of the membranous appendages of the nose (see cut). The ears are very long, furnished with long *tragi*, and united over the region of the forehead for nearly half the length of their inner margins. There are no molar teeth in the upper jaw, and the premaxillary bone, which bears these teeth in other mammals, is only represented in the leaf-bats by a minute cartilaginous plate. The leaf-bats seem to feed rarely, if at all, on insects. The Indian species has been observed to feed on frogs and fish, and even to suck the blood of smaller bats and then devour them. They may be readily distinguished from



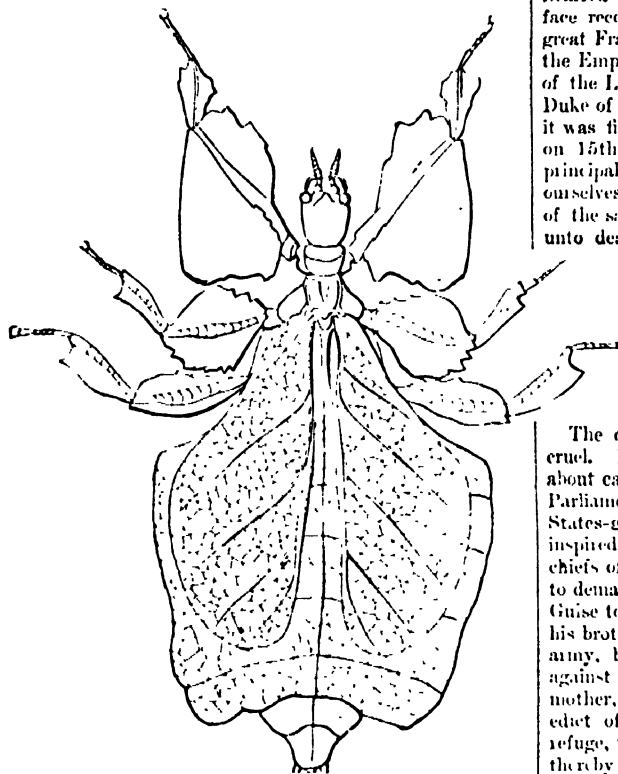
Head of the African Leaf-bat (*Megaderma frons*).

the Phyllostomidæ [see VAMPIRE BATS], some of which have also complicated nasal appendages, by the presence of only two phalanges in the middle finger. The leaf-bats are confined to the tropical parts of Asia and Africa. The Lyre-bat (*Megaderma lyra*) occurs in India and Ceylon. The African Leaf-bat (*Megaderma frons*) occurs in Senegal and Gambia. A third species is found in the Malay Archipelago.

LEAF-BUD is an important organ of plants. It consists of leaves of a rudimentary state, resembling scales, arranged one over the other, and usually in a spiral manner, around a cellular conical centre, which has the power of growing upon the application of certain stimuli, namely, light and moisture combined with a variable degree of temperature. It has an independent power of growth, which it is capable of exercising, if separated from the branch or system to which it belongs. This fact is obvious in the common gardening operation of propagation, for which purpose the buds of plants are cut off and made to form new individuals, as in the process called *budding*, in striking from *eyes* (i.e. leaf-buds), grafting, layering, propagation by cuttings, and the like. None of these

operations can succeed except through the independent vitality of the leaf-bud. The leaf-bud is always produced in the axil of a leaf. The manner in which the scales of a bud are packed varies very much; and according to the appearance they present when cut through they have a variety of names, such as duplicate, imbricate, &c.

LEAF-INSECT (*Phyllium*), a genus of insects belonging to the order Orthoptera and family PHASMIDÆ. These insects are very remarkable for the resemblance they present to light green leaves. The annexed cut shows the female of *Phyllium pulchrifolium*, found in Borneo and Sumatra. The head and front part of the thorax form the stalk, while the abdomen is expanded so as to look like a thin closely-veined leaf. The female has no hind wings,



Phyllium pulchrifolium.

but the wing-covers, or tegmina, are large and nearly conceal the abdomen; the tegmina, when placed close together, resemble a leaf with a strong midrib, from which veins are given off on each side to the margins, and the spaces between them are finely reticulated. The femora and tibiae are dilated so as to give the appearance of little leaves. The male leaf-insect has large gauze-like wings and short wing-covers; his antennae are also very long, while those of the female are short. Several species of the genus *Phyllium* are found in India and the surrounding countries.

LEAGUE, THE (*La Ligue*), sometimes called the *Holy League*, a famous association of mediæval France for the promotion of Catholicism. It grew out of the long series of civil wars between the Catholics and the Protestants (Huguenots) of France, and its primary object was the overthrow of the great heresy. But beyond this the king, Henry III., last of the ignominious children of the cruel Catherine de Medicis, had sunk into such a slough of puerilities and vices, with his dogs and parrots, his

"mignons" and his mistresses, that his own followers heartily despised him, and laid to his charge the new power of the Huguenots. Even after the terrible massacre of St. Bartholomew's Day (1572), which had broken them at the close of the last reign, they were not utterly crushed, and had now in great part revived. Therefore about 1575 the various Catholic associations in France began to draw together, and under cover of a united action in one great league for the maintenance of Catholicism, the overthrow of the Huguenots, and the safeguarding of the king, they secretly prepared to depose the unworthy Henry III., and shut him up in some monastery for his better reformation, putting upon the throne in his stead the powerful Henry, duke of Guise. This duke bore the name of "the Seared" (*Le Balafre*), from a sword wound across the face received in battle. Henry of Guise was son of the great Francis, duke of Guise, reputed to be descended from the Emperor Charles the Great (Charlemagne). The idea of the League was proposed by Philip II. of Spain to the Duke of Guise about the time of the St. Bartholomew, but it was first brought to a head in 1576, when at Peronne, on 15th February, the famous oath was signed by the principal chiefs. Part of this oath ran thus:—"We engage ourselves, our fortunes, and our lives towards the success of the said Union (the League); and we swear to pursue unto death every one who opposes it. A chief shall be elected, whom all the leaguers shall be bound to obey absolutely. This chief shall decide all disputes, and no leaguer shall appeal to the ordinary magistrates without his sanction." Thus did the League transfer actually royal power to the unnamed chief who was hereafter to be chosen. The Pope and the King of Spain warmly seconded their projects.

The queen-mother Catherine was as clever as she was cruel. Instantly she heard of this new association she set about calling the States-general, the nearest approach to a Parliament in France, to counteract their designs. The States-general assembled at Blois, and Henry III. was inspired by the genius of his great mother to summon the chiefs of the League before him, to welcome their aid, and to demand the leadership for himself (1576). The Duke of Guise took the field with an army whose commander was his brother, the Duke of Mayenne; the king also raised an army, both being nominally allies of the League and against the Huguenots (1577). Henry, guided by his mother, soon made terms with the Huguenots, and in the edict of Poitiers (1577) granted them nine towns of refuge, the exercise of their religion except at Paris, &c.; thereby withdrawing any excuse for the longer maintenance in the field of the army of Mayenne. But the death of the king's brother, the Duke of Anjou, in 1583, made the Huguenot king of Navarre (Henry Quatre) next heir to the French crown, and thus at once gave an excuse to the League to re-form and resume its activity. Pope Sixtus V. declared Henry of Navarre incapacitated by his religion from the succession; the League, led by Henry of Guise, stirred up the people alike against the dissolute Henry of France and the heretic Henry of Navarre. Henry III. found himself obliged again to recognize the League; and the "War of the three Henrys" began in 1586, being the eighth civil war between Catholics and Huguenots in France. Henry of Navarre defeated the League in the decisive battle of Coutras (1587), but his own forces left him after the battle, as he was destitute of resources and could not pay them or support them. The destitution of the King of France was almost as great, for having determined to break with the League, who now engaged in a definite conspiracy to dethrone him with the notorious "Council of Sixteen" (heads of the sixteen quarters of Paris), he could not find money enough even to pay a courier to take to the Duke of Guise his proclamation for-

bidding the army of the League to approach Paris. It was sent by post, and the duke denied that he ever received it. Guise entered Paris, 12th May, 1588, and was welcomed by the people with frantic joy. Henry III. determined to assassinate the duke, but the cool courage of the latter bore him safely through the audiences he demanded. But the people were alarmed, threw up barricades, and entered into full revolt ("Day of Barricades"). The queen-dowager discussed terms of surrender of the royal power with Guise in the midst of this turmoil, while the wretched king was profiting by the delay to fly to Chartres.

Guise had thus failed in the great object of the League, that of securing the king's person. He proceeded, however, to exercise sovereign power. Henry III. now thoroughly cowed, once more agreed to the total destruction of heretics, to the disinheritance of Henry of Navarre, to the nomination of Guise as generalissimo, with absolute powers and the governorship of all the chief places in France for several years. In fact, Guise was "maire du palais" over a "roi fainéant." His sister carried at her girdle golden scissors ready to clip the hair of the "new Chilperic."

But the queen-dowager had not yet exhausted her stratagems. Again the States-general assembled at Blois (1588); and while adopting all the avowed designs of the League, Henry was advised to protest against the force used against him. Guise compelled him to withdraw the words. Henry's true object was to entangle Guise in long private negotiations, during which he might be caught unawares and assassinated. This occurred 23rd December, 1588; a courier was found base enough to stab him in the back as he stood in council before the king. Henry kicked the body once or twice, and tremblingly asked, "Is he dead?" "I believe," says the old chronicler, "that if the duke had breathed once more the king would have swooned with fear." The Cardinal de Guise was also assassinated, but two other brothers, the Dukes of Mayenne and Aumale, fled for safety.

Paris was in a mad frenzy at the loss of its great leader. The "Sixteen" were formally declared in power, and the Duke of Mayenne named general of the League. Henry III. hastened to patch up a peace with the Huguenots, and to call to his aid his cousin and heir Henry of Navarre. The latter was also the brother-in-law of the King of France, having married his sister the Princess Margaret. The two kings marched on Paris; a miserable monk named Clement assassinated Henry III. in his tent, and the King of Navarre acknowledged his successor by the dying prince.

Mayenne and the League, on their side, proclaimed Charles, cardinal de Bourbon, the aged uncle of the king, as "Charles X." Elizabeth of England sent 5000 soldiers to the new king, Henry IV., and with these he took and burned the outskirts of Paris, and then thoroughly subdued Normandy. Returning to make a final attack on Paris, he was met at Ivry, near Dreux, by the full strength of the League under Mayenne, and though greatly inferior in force gained a glorious victory (1590). The aged cardinal died the same year, recognizing fully Henry's right of succession. In May, 1590, Henry IV. began the siege of Paris, but had to break it up more than once; and finally in July, 1593, he determined to accept Catholicism, with the bitter cynicism known to every one—"Paris is well worth a mass" ("Paris vaut bien une messe"). The war had for some time been continued for the mere furtherance of private interests. When the son of Marshal Biron, for instance, asked his father for a detachment that he might cut a considerable force of the League which had imprudently exposed its life to destruction, his father replied, "Certainly not! If you were to do that kind of action the wars would soon be over, and we might both go back to Biron to plant cabbages." The famous "Satire Ménippée" appeared in this year (1593), turning the League leaders into ridicule for their petty personal aims, and under the

shafts of this bitter laughter the once famous association dissolved. Its power was over by the end of 1593, but it was not till 1596 that the Duke of Mayenne made peace with Henry IV., upon his recognition as the lawful king by Pope Clement VIII.

LEAGUE, a measure of length. The word *leuca* in popular Latin, "Low Latin" as it is sometimes called, to distinguish it from literary Latin, represented the long "mile" of Gaul, equal to about one and a half thousand paces (*millia passuum*, or mile) of the Romans. *Leuca* is a Celtic word; the Breton is *leo* to this day, and in Vannes *leu*. The word is *lieue* in French. The league was first used in England by William the Conqueror, and was equal to 2 Old English miles—that is, to very nearly 3 modern English miles. It is now a definite nautical measure for most nations, being the twentieth part of a degree at the equator—that is, 3 geographical miles, or nearly $3\frac{1}{2}$ statute miles English. The old French league of the post roads was not quite $2\frac{1}{2}$ English statute miles.

LEAMINGTON or **LEAMINGTON-SPA**, a municipal borough of England in the county of Warwick, 97 miles from London, which has, from a village, in about fifty years become a large, wealthy, and fashionable watering place. It is built on both banks of the Leam, but chiefly on the northern, and occupies the bottom and slopes of a wooded valley. The surrounding country is highly picturesque, and furnishes an almost endless variety of pleasing rides and excursions, diversified by the fine residences of the Warwick, Leigh, Willoughby, and other noble families; the ruins of Kenilworth Castle, Guy's Cliff, Offchurch Bury, Stratford-on-Avon, Blacklow Hill, and other spots equally interesting to the tourist and the antiquary. It is also a fine hunting country, and is much resorted to by lovers of the chase. The main streets, crescents, squares, terraces, and parades of the town are broad and straight, and composed of handsome mansions, villas, dwelling-houses, shops, hotels, and public buildings. The old well or spring was first noticed by Camden in 1586. In 1786 a saline spring was discovered by Benjamin Satchwell, the village shoemaker, the curative properties of which were lauded by many eminent physicians. Early in the present century several new springs were found, and in connection with them establishments for drinking the waters or bathing (of which the Royal Pump-rooms, erected at a cost of £25,000, are the principal) were formed in different parts of the town. The Pump-rooms have hot, cold, vapour, shower, and Turkish baths, with every convenience for drinking the waters, but they are not used as much as formerly. The "season" lasts from October to May, but a great many of the former visitors have become residents, and the population is not nearly so fluctuating as it was before the town had attained its present reputation. The Leamington Spa was styled "Royal," in 1838, with the sanction of her Majesty, who, as Princess Victoria, visited the town in 1830. The main constituents of the waters are, sulphate of soda, 35 grains; chloride of sodium, 30 grains; chloride of calcium, 23 grains; and chloride of magnesium, 11 grains, to one pint. The town contains handsome municipal buildings, erected in 1884 at a cost of £30,000; assembly rooms, built in 1813 at a cost of £10,000; a public library and reading-rooms; a proprietary college, in the Tudor style, erected in 1847; a parish church, restored in 1868, in the Early Perpendicular style; St. Mary's Church, built in 1839; Christ Church, Trinity Church, St. John's, St. Alban's, St. Paul's, and St. Mark's, Milverton; numerous places of worship for Independents, Methodists, Baptists, and Roman Catholics; the Warneford Hospital, enlarged in 1868; the Home for Incurables; the Jephson Gardens, named after Dr. Jephson, a great benefactor of the town; several beautiful promenades, and a well laid out cemetery. The London and North-western and Great Western Railways have stations adjoining each other.

The town was incorporated in 1874, and is governed by six aldermen and eighteen councillors. The population in 1881 was 22,976. In conjunction with Warwick, 2 miles distant, and the adjoining district of Milverton and Lillington, Leamington has returned a member to the House of Commons since 1885. Leamington-Spa, so called to distinguish it from the village of Leamington-Hastings, was known in early times as Lamintone, and originally belonged to Geoffrey de Clinton, the founder of Kenilworth Castle and Priory; but, being seized by the crown in 1563, was then given to the earls of Warwick, and subsequently to those of Aylesford, with whom the manorial rights now rest.

LEANDER (*Leandros*). See **HERO AND LEANDER**.

LEAP YEAR, the name given to every fourth year of the Julian calendar, in which one additional day (a twenty-ninth day of February) is reckoned. This correction constitutes the distinction of the Julian calendar; the necessity for the Gregorian correction arises from the years being made a very little too long, one with another, when they consist of 365½ days each, as is the case when a day is added to each fourth year. The Gregorian correction is made by omitting three leap years in four centuries, and it is settled that the common years, which would otherwise be leap years, shall be those which terminate centuries in which the first pair of figures is not divisible by four. Thus the years 1800 and 1900 are not leap years, but 2000 is leap year; 2100, 2200, 2300 are not leap years, but 2400 is leap year.

LEASE. A lease or letting is sometimes called a *Demise* (*demissio*). He who lets land, whether it be for agricultural purposes, or merely a piece of land with a dwelling-house on it, is called the Lessor, and he to whom land is let is called the Lessee. A lease is not properly a conveyance, though it is sometimes called so; it is merely an interest in land for a certain time, and on certain terms. The fact of a lease for years being called an Estate does not alter the nature of the thing. The reservation of a rent is not essential in a lease, but payment of rent is now the chief condition on which lands are let.

To constitute a lease, it is necessary that the lands must be let for a less time than the period for which the lessor has an interest in the lands. If a man parts with all his interest in the lands or tenements, the conveyance is an assignment, and not a lease. The relation that is created by a lease between the lessor and the lessee is usually expressed by the phrase landlord and tenant. The lessor has a reversion in the lands which are demised, that is, after the expiration of the lease the land reverts to him. The lessor, by virtue of this reversion, seignior, or lord's title, has the power of distraining on the land for the rent which is agreed on, and for the services which may be due by the terms of the lease; and fealty is always due to the lessor. [See **FEALTY**.] The ordinary lease is that for a term of years, by which lease a rent, generally payable in money, at stated times, is reserved to the lessor. These stated times are usually quarterly periods.

The interest which a man acquires in land by a lease for years is a term of years, or an estate for years. The word lease is used in common language also to signify the estate or interest which the lessee acquires by the lease; but properly it signifies the contract by which the lessee acquires the interest in the lands.

A deed is not necessary to constitute the writing a lease, unless the tenement is an incorporeal hereditament or a reversion or remainder. But leases are generally made by deed, because covenants can be made only by deed. A lease may contain any agreements that are lawful. The agreements or covenants in farming-leases ought to be such that the lease may be most beneficial to the landlord and the tenant, and by consequence to the public generally; but this is not always the case in England at present.

The chief subjects of leases are dwelling-houses and buildings of all kinds, cultivable lands, and mines. Many persons who have not the complete ownership of houses and lands are enabled to grant leases under particular powers; and there are many statutes under which particular classes of persons are enabled or restrained as to the granting of leases, such as bishops, deans and chapters, and others.

Leases in general require either an *ad valorem* stamp or the common deed-stamp, without which the instrument cannot be given in evidence.

By the law of Scotland a lease or tack is a contract of location, by which the use of land, or any other immovable subject, is let to the lessee or tack-man in consideration of a determinate yearly rent or duty, to be paid or performed to the lessor or landlord either in money, the fruits of the ground, or services. (Elsk. "Inst." ii. 6, 20.)

At an early period in Scotch law, the legislature interfered to protect the rights of tenants, by converting what had originally been a precarious and uncertain grant, liable to be terminated at any time at the pleasure of the lessor, or by the lands passing into other hands, into a real and indefeasible right in favour of the lessee, passing to his heirs in the event of his death before the *ish* or term of his tack. This was accomplished by the Act 1449, c. 18, which, "for the safety and favour of the poor people that labour the ground," provided "that they and all others that has taken or shall take lands in time to come from lords, and has terms and years thereof, suppose the lords sell or assaillie that land or lands, the takers shall remain with their tacks until the issue of their terms, whose lands soever the lands come into." To give a lease the benefit of this Act it is requisite—(1) that the lease be in writing; (2) that it set forth definitely the name of the parties to it, and describe the subjects let; (3) that it specify the rent, either of money or grain, payable by the tenant; (4) that it have a determinate *ish* or term of endurance; and (5) that it be followed by possession on the part of the lessee.

The intention of the Act was to protect tenants against purchasers from other singular successors of their landlords, and for that purpose the above requisites are necessary; but against the grantor and his heirs a lease, provided it be in writing, will be effectual although the term of endurance is not specifically fixed, and even though no rent should be stipulated for.

By 20 & 21 Vict. c. 26, it is competent to make use of a lease as security in payment of borrowed money, or annuities, or provisions to wives and children; that Act providing that leases for thirty-one years and upwards may be recorded in the register of sasines, and that such recorded leases may be assigned in favour of creditors, the regulation of the assignment being declared effectual to complete the creditor's right under it. Power is also given to the creditor, in default of payment, to enter into possession of the subjects, uplift the rents, sublet the lands, or to sell the lease.

Leases may either be in writing or verbal. If constituted verbally, a lease cannot endure for more than a single year. Any writing, however informal, if followed by possession, and containing *in grando* the requisites of the Act 1449, will be as effectual as a formal written lease, not only against the grantor and his heirs, but also against purchasers and other singular successors.

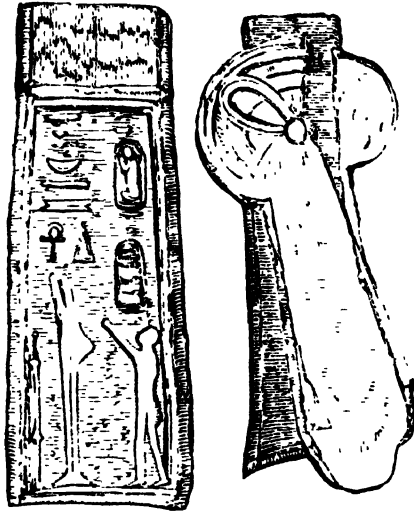
Leases may be renewed from time to time, not only by special agreement, but by tacit relocation; but tacit relocation is not held to be a renewal of the lease for the original term, but only for the current year. Leases terminate either by the landlord removing the tenant for non-payment of rent, or by the tenant's renunciation of the lease, or by the expiry of the term for which the lands have been let. The rules applicable to these proceedings

are too numerous to be detailed here. See LANDLORD AND TENANT.

LEAST COMMON MULTIPLE. See COMMON MEASURE.

LEATHER. This substance, which is universally employed throughout the civilized world, and the use of which reaches from beyond the dawn of history, is prepared from the skins of animals chemically changed by the process of tanning. The change resulting from this process is effected by means of a substance residing in several vegetable matters, to which the name of *tannin* has been given. When this tannin, which is soluble in water, is applied to the hides of animals from which the hair, epidermis, and any fleshy or fatty parts adhering to them are removed, and which hides then consist almost wholly of *gelatin*, also soluble in water, these two soluble substances so unite chemically as to form the wholly insoluble substance called leather.

The inhabitants of the great centres of civilization, such as Egypt and China, early acquired the art of preparing the skin. Tanning must have been practised by the Egyptians



Ancient Egyptian Leather Strap (about 900 B.C.)

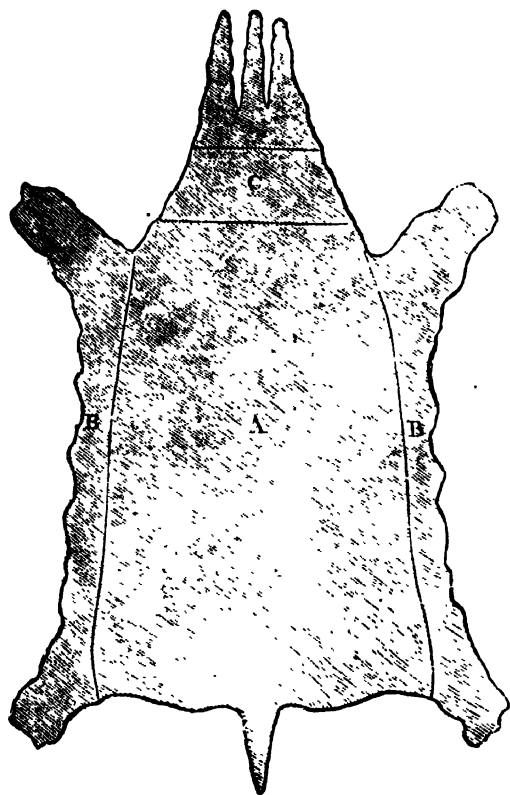
2700 years ago, as is evidenced by the pieces of embossed goat leather straps taken from a mummy, and now exhibited in the British Museum. The figures on the strap represent the first or second King Osorkon adorning the god Bhem.

The skins of all the Mammalia (man not excluded) may be made into leather, but in practice it is only from a few of the larger animals that the supplies used in commerce are obtained, and of all hides and skins used by the tanner the most important and valuable are those of oxen. These are obtained in immense numbers from the animals raised in Great Britain or imported for food; but large as are the numbers thus obtained, they are totally insufficient for the requirements of the trade, and they would become of extravagant value were it not for the large supplies imported from other countries. Large quantities of hides are brought into Great Britain from Russia and North Germany, but it is from South America that the largest amount is procured. South American hides have been imported into Europe for over 300 years, and at the present day the vast herds which roam in a semi-wild state over the plains of South America are valued chiefly for their hides and horns, their flesh being regarded as of little value. Other sources of supply are found in Australia, the East Indies, and North Africa. Of the ox hides which

are converted into leather those supplied by bulls are thicker, stronger, and coarser in the grain than those of cows, while the hides of bullocks are intermediate between those of the bull and cow. The skins of calves, though thinner than those of cows, are thicker than most other kinds of skins which are converted into leather. Intermediate between the heavy ox hides and calf skins are East Indian kips, the hides of young cattle of a medium weight, which are imported in such large quantities as to form a distinct branch of the trade. The leather produced from ox hides is employed for the soles of boots and shoes, for most parts of harness and saddlery; for leather trunks, buckets, hose for fire-engines, and pump-valves; for the thick belts used in military accoutrements, and for machinery belting. Next in value to the hides of oxen are those of sheep, which are imported in large quantities (in the wool) from Australia and the Cape, and (tanned) from the East Indies. Goat skins, formerly the only material used in making morocco leather, are also obtained in large numbers, in a tanned condition, from the East Indies; and they are also imported from the Cape, North Africa, South America, Asia Minor, and other places. Sheep skins, when simply tanned, are used for bookbinding, furniture, leathering bellows, and various other purposes for which a cheap leather is required. All the *whit-leather*, as it is called, which is used for whip-thongs, bags, aprons, &c., is of sheep skin, as are also the cheaper kinds of *wash-leather*, of which gloves, under-waistcoats, and other articles of dress are made. Mock or imitation morocco, and most of the other coloured and dyed leathers used for women's and children's shoes, carriage linings, and the coverings of stools, chairs, sofas, writing-tables, &c., are also made of sheep skin. Lamb skins are mostly dressed white or coloured for gloves, and those of goats and kids supply the best qualities of light leather, the former being the material of the best morocco, while kid leather affords the finest material for gloves and ladies' shoes. Leather from goat skins, ornamented, and sometimes gilt, was formerly used as a hanging or covering for walls. Horse hides, which, considering their size, are thin, are used chiefly for harness-making; and hog or pig skins, which afford a thin but dense material, are used chiefly as a covering for saddles. Deer and antelope skins are generally dressed by the oil process, and form a great portion of the chamois leather used for riding-breeches, &c. Dog skins, which are thick and tough, and form excellent leather, are tanned or tawed for gloves and for thin shoes and boots. Seal skins, which form an important item in the whaling industry, are of a light but close texture, and when tanned yield a very strong, plant leather, used in shoemaking and in the preparation of crumel and japanned leather. Among the materials used locally or only to a limited extent are walrus and hippopotamus hides, which, being of immense thickness, are extremely useful for many purposes, among which perhaps the most important are the making of belts for driving machinery, and buffing-wheels used in the manufacture of cutlery and for giving a polish to metal and horn goods. Kangaroo skins are tanned and tawed in Australia, and they yield leather of an excellent quality, fine in texture, strong and elastic, which is in great request for gentlemen's dress boots. Alligator leather has for several years been used in the United States, and the material is now sought after in Europe, the supply being, as might be expected, somewhat limited. It has a rough, scaly surface, and is only used for bags and fancy goods.

The subjoined figure shows the divisions of a hide. In large hides these divisions are often tanned apart. A is the butt, which contains the stoutest and best part of the hide, suitable in the hides of oxen for sole or belt purposes. The pieces by the side, B, C, are termed bellies or offal; being thinner in substance, they do not require so lengthened a tanning process. The head is reserved for the glue

merchant; the shoulder, c, is sometimes cut of considerable depth, the inner portion being termed a *range*. No definite directions can be given as to the selection of hides; experience and common sense are the best guides. A loose flabby hide will naturally give a leather of a similar character; no after process can remedy a bad pelt. Many hides



Divisions of a Hide (Cow).

have a weak place in the back, about 2 feet from the horns; and some are occasionally met with thin in the butt, and correspondingly thick in the offal.

The processes adopted in the preparation of leather are of a somewhat elaborate character and embrace a great variety of methods, the most important being those of unhairing, tanning, and currying.

Hides as received at the tannery are either soft and moist, as when procured from local abattoirs; or salted (wet or dry), as they come from abroad. The first operations are directed towards the cleaning them from dirt, blood, and salt, so as to bring them into a soft flaccid condition. They are then, in the English process, steeped for three or four weeks in pits filled with a strong watery ley of lime, with lime in excess. The action of the lime loosens the hairs, and at the same time it combines with the fatty matter of the skin, forming an insoluble lime-soap, which is subsequently removed. Another process used in England for skins, and on the Continent for both skins and hides, is to lay them in a warm place and leave them until an ammoniacal odor shows that a slight putrefactive decomposition has commenced, which causes the hair to become so loose that it is easily removed. In America this sweating is performed cold, the hides being hung up wet in a damp underground cellar for ten days or a fortnight. In the case of limed stock the hides, after being drawn from the pits, are stretched over an unhairing beam and freed from the hair

by means of a blunt two-handled dressing-knife. Another knife cuts away from the other side of the hides any flesh or fat the butcher may have left. They are afterwards macerated in water and shaved down so as to be brought as far as possible into a state of uniform thickness. If wanted for upper-leather, they are then submitted to a process, called *bating*, to reduce the thickening caused by the lime, which is carried out by working the skins in a decoction of pigeon's or dog's dung in warm water. Glucose is now much used in preference to this objectionable "pure," as it is called. Another operation, called *raising*, designed to open the pores of the material and so enable it more quickly to imbibe the tanning solution, is effected by immersing the hide in a bath of water acidulated with about one-thousandth part of sulphuric acid. The hides are now ready for trimming and cutting into the shape in which they are intended ultimately to be sent to market, and for the process of actual tanning.

This consists essentially in impregnating the fibres of hides with tannin, which acts as an astringent and preservative; but many different methods are adopted by tanners for this purpose. The old process, formerly universal in England and still practised on the Continent, consisted in laying at the bottom of the tan-pit a bed of oak-bark. Upon this were laid the hides, then more bark and more hides in layers, until the pit was full, when water was let in, and the hides were left to be acted upon by the bark for some months. The pit was then emptied and the hides returned with a supply of fresh bark, the process being repeated until the tanning was complete. As it required at the least one year, and sometimes a much longer time, to complete the process, it is now rarely carried out. The more common method is to expose the hides to the action of a liquor, which is impregnated with the colouring matter used in the tanning process, for about a week, then to subject them to the action of tanning infusions in large pits, moving them frequently from one pit to another, while constantly increasing the strength of the tan-liquor; and finally the hides are carried over into the layers or lay-aways, where they are spread out and subjected to the action of the strongest tan-liquor, a layer of powdered bark being also placed between the separate skins. When the hides have acquired a rich brown colour they are considered sufficiently tanned, and are then drained, soaked, and removed to the drying loft, where, after being lightly rubbed over with oil, they are hung to dry. There have been many devices introduced into tanning to shorten the time occupied in the process, some of which display great ingenuity; but in scarcely any case have they proved successful in practical working, so far as the production of good leather is concerned. One of the latest and most promising is that of chrome tanning, introduced by Dr. Heinzerling, a German chemist. By this process light skins—such as sheep and calf skins—are tanned in less than a week, ox and buffalo hides in a fortnight, and walrus hides over 2 inches thick in two weeks. The leather differs somewhat in appearance from that in ordinary use, but is said to be wonderfully strong and waterproof. In the ordinary tanning the materials usually employed are, oak bark, mimosa bark, hemlock bark, Quebracho wood, valonia, which consists of the acorn cups of a species of oak; myrobalans, the dried immature fruit of a species of *Terminalia*; *Divi-divi*, sumach leaves, catechu, and gambir.

Tawing consists in preparing the skins by means of antiseptic materials, which preserve them from decay; but by this operation no chemical change is effected in the gelatin of the skin. It is principally used for thin and light skins—of sheep, lambs, kids, and goats. The products obtained are of a pure white colour, hence the technical name of white leather for goods of this class. The preliminary processes of unhairing, washing, and dressing the skins intended for tawing are very similar to those already

described in tanning; but, instead of the latter process, they are treated with a paste composed of alum, salt, flour, yolk of eggs, and water, with which they are thoroughly impregnated. They are afterwards dried, shaved down, dressed with white of egg or gum, and dyed.

Shamoying is carried out by treating the skins with oil alone, and it is probably the most ancient form of leather manufacture. Most of the chamois leather is made from the inner or flesh side of split sheep skins, which, after the lime treatment, are soaked in a mixture of bran and water, rinsed in an acid liquor, and then rubbed over with a fish oil, which is well beaten into their substance. They are afterwards felled to render them supple, and they are then hung up to dry. The operations of oiling and drying are repeated from six to twelve times, according to the thickness of the skins treated, which are finally washed in a solution of potash to remove the uncombined oil, and the leather is then ready for use.

Currying is the general name given to the various operations of dressing leather after the tanning is completed, by which the requisite smoothness, lustre, colour,

wood or glass for rubbing the surface of the leather; and when the leather is intended for the use of the shoemaker, he applies to it some kind of greasy composition called dubbin or stuffing.

Japanned leather of different kinds is used in coach-making, harness-making, and for various other purposes. Patent leather is covered with a coat of elastic japan, which gives a surface like polished glass, impermeable to water; and hides prepared in a more perfectly elastic mode of japanning, which will permit folding without cracking the surface, are called enamelled leather. Such leather has the japan annealed, something in the same mode as glass; the hides are laid between blankets, and subjected to the heat of an oven at a temperature of 150° Fahr. during several hours.

In making Russia leather, the skins are freed from the hair or fleece by steeping them in an ash-lye, then rinsed, felled, fermented, and cleaned. They are then soaked for forty-eight hours in a bath composed of water mixed with a paste of rye-flour. The skins, when taken out of the bath, are left in tubs for fifteen days, then washed, and immersed in a boiler containing a hot decoction of willow bark, in which they are handled and pressed for half an hour. This manipulation is repeated twice a day for a week, after which the tanning infusion is renewed, and the process is repeated on the same skins for another week. After tanning, scouring, and setting out, the hides are treated on the flesh side with an empyreumatic oil obtained by the dry distillation of birch-tree bark and buds, to which the peculiar smell of the leather is due.

Shagreen, a peculiar kind of leather, or rather of prepared skin, formerly much used for the covers of watch-cases, mathematical-instrument cases, &c., is produced by soaking, scraping, rubbing, softening, salting, and dyeing. The unevenness of surface is produced in a singular way. The grain side of the skin is strewed with the hard round seeds of the goose-foot or alabuta. A felt being laid over these, they are trodden deeply into the soft-yielding skin; and when dried the seeds may be shaken out without violence, leaving the skin in a hard horny state, covered with deep indentations.

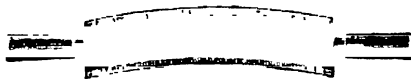
Leather cloth, more generally known in England as American leather, is made of unbleached calico, coated with a mixture of boiled linseed oil and turpentine, and coloured. It was first invented by Messrs. Crockett, of Newark, U.S., but is now made in very large quantities in England. Its uses are very numerous, as its low price enables it to be employed for purposes for which leather would be too expensive.

Leather Trade.—The leather manufacture is one of great importance in this kingdom, giving employment in all its branches to more than 400,000 persons, including tanners, curriers, shoemakers, glove-makers, harness-makers, saddlers, &c. It has been computed that the manufactured articles are worth from three to four times as much as the leather itself, and that the total annual value must be at least £30,000,000.

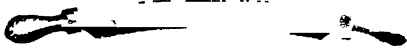
Old leather, particularly of old boots and shoes, is now extensively utilized, by being cut up into small pieces and then put for a couple of days into chloride of sulphur, the effect of which is to make the leather very hard and brittle. When this is fully effected, the material is withdrawn from the action of the chloride, washed with water, dried, and ground to powder. It is then mixed with some substance that will cause it to adhere together, such as shellac or other resinous material, or even good glue, or a thick solution of strong gum. It is afterwards pressed into moulds to form combs, buttons, and a variety of other useful objects. Another use of old leather is that of making prussiate of potash (ferrocyanide of potassium). It is heated with pearl ash and old iron hoops in a large pot. The nitrogen and carbon form cyanogen, and then



Enhaling Beam.



Dressing Knife.



Trimming Knife.

and suppleness are imparted. The processes of the currier are various. The first is styled *dipping* the leather. It consists in moistening it with water, and beating it upon a trellis-work of wooden spars with a mallet or mace. After this beating, by which the stiffness of the hide or skin is destroyed, it is laid over an inclined board, and scraped, cleaned, and pared or shaved down on the flesh side, by the careful application of various two-handled knives; and then thrown again into water, and well scoured by rubbing the grain or hair side with pumice-stone, or with a piece of slaty grit, by which means the *bloom*, a whitish matter which is formed upon the surface in tanning, is removed. The leather is then rubbed with the *pommel*, a rectangular piece of hard wood about 12 inches long and 5 broad, grooved on the under surface, and fastened to the hand. The currier uses several of these instruments, with grooves of various degrees of fineness, and also, for some purposes, *pommels* of cork which are not grooved at all. The object of this rubbing is to give grain and pliancy to the leather. The leather is then scraped with tools applied nearly perpendicular to its surface, and worked forcibly with both hands, to reduce such parts as may yet be left too thick to a uniform substance. After this, it is dressed with the *round knife*, a singular instrument which pares off the coarser fleshy parts of the skin. In addition to these operations, the currier uses occasionally polishers of smooth

unite with the iron and potassium. The soluble portions are dissolved out, and the resulting salt added to one of iron produces the well-known Prussian blue, either for dyeing purposes or as a pigment.

LEAVEN, a small quantity of sour dough, which was formerly largely employed to bring about the fermentation of a large mass of fresh dough. The leaven was mixed with the dough, and the mixture allowed to stand in a warm place. Fermentation was gradually set up, gases being evolved which rendered the paste light, as in the ordinary process of breadmaking. Leaven is now to a great extent superseded by harm or yeast. See YEAST.

LEAVENWORTH, a town of Kansas in the United States, the capital of a county of the same name, situated on the Missouri River 25 miles above Kansas City, and 309 miles distant from St. Louis by rail. Founded in 1854, it is now the largest city in the state, and has a Roman Catholic cathedral, and numerous churches, banks, and government and charitable institutions, and an extensive trade. It has also manufactories for railway material, furniture, and shoes, and several iron foundries. It is supplied with abundance of bituminous coal from two mines situated in the vicinity. The population in 1880 was 16,546.

LEBANON. A little to the north of Tripoli begin two mountain ranges, which, running parallel to each other, extend southward for a distance of about 80 miles to the northern boundary of Palestine. Anciently the name of Lebanon was indiscriminately applied to both of these, but they are now styled Lebanon and Anti-Lebanon, or Anti-Libanus, the former being the range running nearest to the sea, while Anti-Lebanon lies so far inland as to overhang Damascus. The Lebanon may be regarded as bounded on the N. by the valley of the Nahr-el-Kebir, beyond which to the N. rises the Nusairgeb group of mountains; while the Anti-Lebanon, trending off N.E. in about the same parallel E. of the Lake of Homs, traversed by the Orontes, sinks in altitude, and is lost in the Syrian desert, whose average height is about 2000 feet. Between these ranges lies the fertile valley of Cœle-Syria (Hollow Syria), varying from 4 to 10 miles in breadth. This was anciently the "Land of Hamath," and is now called by the natives El Bekaa, or "The Valley." Its southern extremity is crossed by a hill range, 2500 to 3000 feet in height, which unites the two Lebanons, and over which is a mountain pass, "the entering in of Hamath." Lebanon attains its greatest elevation, 10,539 feet, near its north-east extremity, while Anti-Lebanon terminates at its south-western in the gigantic mass of Hermon, or Jebel-es-Sheikh ("the chief of mountains"), which rises to the height of 9383 feet. The highest peaks of both are covered with snow till the end of May or early in June; but it is only in the deep, shaded ravines that it is to be found throughout the year. The summits and both sides of Lebanon, for a short distance down, are quite barren, as are many parts of the eastern side, looking towards the desert; but the western side, and some of the lower parts of the eastern, are covered with firs, oaks, mulberry trees, &c., and in some more favoured spots the vine and fig-tree may be seen, while most of the valleys afford good pasturage. In a valley towards the north-east of the range there still grow a few of the old cedars for which Lebanon was once so famous. Anti-Lebanon is more barren than its neighbour, except the valleys, which afford tolerable pasturage, while the mountain sides grow little else than stunted white-thorns and shrubby and scattered brambles; but the larch, the willow, and the mountain-ash grow abundantly on the banks of the Abana, Pharpar, and other streams that wind through its deep and narrow valleys, in some of which are luxuriant orchards of the apricot, almond, and pear.

The celebrated cedar grove is situated close to the summit of the range and village of Baherreh, on an eminence

between two water-courses of the western drainage, 6300 feet above the sea-level, on the route from Tripoli to Baalbec, 18 miles south-east of the one and north-west of the other. The crest of the pass here, called Jebel-el-Arz, is 7703 feet above the sea-level, or 1403 feet higher than the hill of the cedars. The view from the summit-level embraces the Anti-Lebanon, with its culminating peak the Great Hermon, the valley of the Bekaa between the ranges, the deep depression of the Jordan, the town and harbour of Tripoli, and a wide expanse of the "Great Sea" westwards. The immediate foreground is crowded with mountains: Dahr-el-Khodib, immediately to the east of the grove, 10,050 feet high; El-Miskiyeh and Makhmal, north-east, 10,037 and 10,007 feet respectively; and Timarum, to the north, 10,539 feet, the highest summit of the entire Lebanon. The cedars form a grove of about 350 trees, the tallest being 78 feet high, the oldest on the south-east side, but only five or six very aged. Other groups occur in various parts of the Lebanon, at heights from 5200 to 6200 feet of elevation. The Cilician Taurus, to the north of Tarsus, contains magnificent forests of these trees. Here, as in Lebanon, there are two varieties of the tree, one with dark green stem and bright green leaves; the other silvery, the leaves having a bluish bloom. Both of these, and the splendid cedar of the Atlas (*Cedrus Atlantica*), are but climatic varieties of the Himalayan cedar (the *deodaru* or wood of the gods), the *Cedrus deodara* of botanists; but in the moist climate of the outer Himalayas it attains a much larger growth, reaching the height of 250 feet, with a girth at the base of 39 feet, or twice the size of the cedar of Lebanon. See article CEDAR.

The western side of Lebanon is very thickly studded with the villages of the Maronites and Druses, whose chief occupations are tending the silkworm, cultivating the vine, and feeding sheep. Numbers of the men are employed in conveying merchandise on the backs of mules from Beyrout to Damascus. The eastern side, and also Anti-Lebanon, are far more thinly inhabited than this is, and in climbing the eastern side only stray villages and houses are met with; but once a view of the western side is gained, the scene is greatly changed, for here the eye rests on deep fertile valleys and pine-clad heights beautifully studded with villages and scattered houses. There are traces of a Roman way on the eastern side of Lebanon, and on the direct route from Beyrout to Damascus. Between these cities, a distance of 70 miles, there is an excellent road, begun by the French in 1860, on which there is a rapid and punctual "diligence" service. The highest point of this road, called the Lebanon Pass, is 5060 feet above the sea, and the service is thus liable to interruption during the winter snow-falls.

Both mountain ranges consist mainly of limestone, of neocomian or lower cretaceous age; on the west slopes of both a sandstone underlies the limestone, and appears in other parts of Syria reposing on granite and gneiss; the limestone is overlain in many parts of both chains by nummulitic fossiliferous beds of eocene tertiary age.

The majority of the population is Christian, and the rest Mohammedan. The Christians are of various sects, as Roman Catholic and Greek, the Maronites, and others. The Druses are a Mohammedan sect, who took their rise in the beginning of the eleventh century. Nowhere are the ancient customs more strictly preserved than among the inhabitants of this mountain region. The active interference of the French after the massacres of 1860 secured important privileges for the Maronite and other Christians; they are governed by a pasha of their own faith, and are in great measure independent of Turkish rule.

LECCE, a city of South Italy, and the capital of a province, is situated 210 miles east from Naples, and nine from the coast of the Adriatic. It comprises the usual appendages of a provincial capital—a seminary, tribunal, and theatre; and adds to these a large manufactory of

tobacco, the produce of which, as snuff, is highly esteemed throughout Italy. The former principal gate of entrance to Lecce is very magnificent, though in a strange overloaded style of architecture. The facility with which the stone of the country is wrought has proved of great advantage to the architectural embellishments of Lecce, but it has also afforded a fatal facility for propagating the extravagant taste exemplified in every building of consequence. Among these edifices the churches are pre-eminent; they exhibit all the grotesque barbarity of the Gothic, without any of its spiry lightness. In the principal square is an antique column brought from Brindisi; it supports the statue of St. Oronzio, the protecting saint. Considerable trade is carried on here in the agricultural products of the country, the principal of which are oil, tobacco, wool, cotton, and gunn. Sybaris, or Lupiae, on the site of Lecce, was very ancient. Augustus remained in it for some days after his return to Italy on hearing of the death of Caesar. In the middle ages it was called *Lycium*. It was made the fief of an earl soon after the establishment of the Normans; and Tancred, one of its earls, succeeded to the crown of Naples in 1189. The population in 1881 was 25,141.

LECHÉE (*Onotragus lechæ*) is an antelope inhabiting South Africa. It is closely allied to the water-boc both in character and habits. The horns, which are only present in the male, are elongated, marked with transverse rings,



Poku and Lechée (*Livingstone*).

and curve forwards at the tip. In colour the lechée is light brown above, darker on the limbs, and white below; the tail is tufted and black at the tip. It is a water-loving antelope, frequenting marshy places, and is met with in large herds. The illustration shows also the poku, a smaller antelope, very closely resembling the lechée.

LECIDEA is a genus of LICHENS which are common and well known as stains on walls and incrustations on stones and trees. The "fruit" is borne on discs which have an edge, distinct when young, and of the same colour as the disc itself. The common golden-coloured incrustation on rocks, &c., belongs to this genus, and is called *Lecidea aurorum*.

LECITHIN, one of the complex nitrogenous fats of the higher animals. It is easiest obtained from the yolk of egg, where it occurs in conjunction with vitellin. Its formula is $C_{44}H_{90}NPO_8$. It is widely spread in the human body, occurring in blood, bile, serous fluids, &c., in small quantities, and very largely in the brain, nerves, white

corpuscles, &c. It is colourless, and slightly crystalline when pure, very readily decomposes, and if heated with baryta water separates into marin, glycerin-phosphoric acid, and barium-stearate. Professor Michael Foster ("Physiology," 1879) thus represents the combination:— $\text{Lecithin } (C_{44}H_{90}NPO_8 + 3H_2O)$ equals stearic acid, $2C_{18}H_{36}O_2$ + glycerin-phosphoric acid, $C_3H_9PO_4$ + neurin, $C_5H_{15}NO_2$.

The glycerin-phosphoric acid ($C_3H_9PO_4$), which thus occurs as a decomposition product of lecithin, may be synthetically produced by heating glycerin and glacial phosphoric acid, when one molecule of each unites and one molecule of water is eliminated.

LECONORIC or ORSEL'LIC ACID is an acid contained in various lichens of the genera *Leconora*, especially the *Rocella tinctoria*. It crystallizes in colourless needles, is slightly soluble in water, soluble in alcohol and ether. The formula is $C_{16}H_{16}O_7$. It forms a number of salts called leconorates, which are remarkable for their dyeing properties. Leconoric acid with ammonia assumes a fine purple colour.

LECTERN or LETTERN (Lat. *lectorium*) is the name given to the movable reading-desk from which the Scripture lessons are read in our cathedrals, college-chapels, and many churches. It is usually made of wood or brass. When of the latter material, the upper part, on which the book is supported, is frequently in the form of an eagle with outstretched wings.

LEC'YTHIS is a genus of plants with singular fruits and very large fleshy flowers, inhabiting the woods of South America. They belong to the order MYRTACEÆ. *Lecythis ollaria* is a tree growing in the forests of Brazil, with a hard woody fruit ("monkey pots") as large as a child's head, and opening by a lid like that of a jar or urn. It contains numerous large seeds. *Lecythis Zapenjo* is a large Guiana tree, with handsome-shaped fruit containing numerous seeds as large as BRAZIL NUTS and even more agreeable when fresh. They are sometimes seen in the fruiterers' shops in London, and are known as Sapucaia Nuts. In this genus the flowers have a six-lobed calyx, six petals, and stamens while still young covering the centre like a hood. The trees grow to a height of 80 or 90 feet.

LE'DA, mother of the great twin heroes Kastör and Poludeukēs (Castor and Pollux), and of Helena the fair lane of Troy, was daughter of Thestios, and wife of the King of Sparta, Tundareos. Homer, in the *Odyssey*, makes the twins the children of Leda by her husband, and Helena by Zeus. But the usual form of the legend is that Zeus, enamoured of Leda, visited her in the form of a magnificent swan; and that she was delivered of two eggs, from one of which issued Kastör and Poludeukēs, and from the other Helena.

Still another form of the myth is frequently found among classic poets. According to this Leda met both Tundareos and Zeus, and bore four children, Kastör and Klutaimnéstra (mortal) to the first, Poludeukēs and Helena (immortal) to the second. Klutaimnéstra (Lat. *Clytemnestra*) became the wife of Agamemnon, and Helena of his brother Menelaos.

LEDGER, LEDGER-LINES. The ledgers of the counting house, and the musical ledger-lines, as they are inaccurately called, are both often referred for the origin of their name to the French *leger*, light. The light lines in the margins of books of account are said to give the name. The derivation is true as to music [see **LEGER-LINES**], but as to book-keeping it is almost exactly the opposite of truth. For a big book, one which lies about, is a *liggar* in Middle English (*liggen*, to lie); and further, the liggar or ledger is the book which lies always to hand, the permanent book of account. So in earlier times permanent ambassadors, as distinguished from envoys, were styled "ledger ambassadors."

LEDGER-LINE, tackle used in fishing for barbel or bream; its peculiarity consists in a leaden bullet being fastened to the line about 20 inches above the hook, so that when cast into the water the lead rests upon the bottom, and the hook end of the line swims loosely about. The rod end of the line is kept as tight as possible without lifting the lead off the bottom, till a fish bites at the bait, when a sudden strong pull brings it to land.

LEDRU-ROLLIN, ALEXANDRE AUGUSTE, a celebrated French democrat, was born of good parentage, at Paris, 2nd February, 1807. He was educated for the bar, and became an *avocat* in 1830, when he adopted the family name of Rollin to distinguish himself from another *avocat* also named Ledru. An ardent Liberal from his youth, he attracted attention by some pamphlets on political subjects, and for several years was constantly retained as counsel for the defence of journalists and agitators compromised by their revolutionary zeal. He was elected as deputy for Le Mans in 1811, and at once took up a prominent position as an advanced republican and advocate of the rights of the labouring classes. With Lamartine and Louis Blanc he had become very popular with the masses, when the political banquets of 1847 heralded the approach of revolution. On the formation of the provisional government he was chosen minister of the interior, and during his four months of office succeeded in establishing a working system of universal suffrage. He soon experienced, however, the fickleness of the mob, and on resigning the office found his old popularity had disappeared. He was a candidate for the position of president in December, 1848, but only polled 370,000 votes. In 1849 he headed what he called a peaceful demonstration, but which the government called an attempt at insurrection, and he was compelled to take refuge in England. In 1850 he published his only considerable work, the "*Décadence de l'Angleterre*," in which he endeavoured to predict the downfall of the country that had given him shelter, from its aristocratic form of government and the misery of the poorer classes. With Kossuth, Mazzini, and Ruge, he founded the revolutionary committee which endeavoured, from London, to direct the policy of the ultra-democratic party in Europe; and in 1857, for alleged complicity in the affair of Orsini, he was condemned in his absence by the French tribunals to transportation for life. After an absence of twenty years he was permitted to return to France in 1870, and in 1871 was re-elected to the Assembly, but refused to sit. In 1874 he consented to sit for the department of Var, but died 31st December of the same year. A statue was erected in his honour at Paris, in 1885, in the Boulevard Voltaire, which was unveiled by his widow. Victor Hugo, speaking at his funeral, described him as the "Tribune of the Revolution of 1848."

LE DUM, a genus of plants belonging to the order ERICACEÆ. *Ledum latifolium* is a small evergreen shrub with an irregularly branched stem. It is a native of the swamps around Hudson's Bay, Labrador, Greenland, and various parts of the United States. It is known as Labrador Tea, from the use to which the leaves are put. Bees are very fond of the flowers, which are white and clustered at the ends of branches. This and the other species of *Ledum* have been used as stomachics. *Ledum palustre* (the marsh *ledum*) is found not only in North America but also in the northern parts of Europe. The leaves of this species were used as tea by Sir J. Franklin and his companions, and the beverage was found useful against ague and dysentery. In this genus the calyx is minute and four-toothed, the corolla has five spreading lobes, capsule five-celled, seeds numerous, with a membranous wing at each end.

LEE, LEEWARD (pronounced *lee'ward*), nautical terms referring to the position of a ship regarding the wind. The side next the wind is called the *weather* or

windward side, the other is the *lee* or the *leeward side*. The word is the Old English *læn*, a shelter; and to be under the lee of any object is to be sheltered by that object from the force of the wind.

A *lee-tide* is a tide running leewards, that is, before the wind. A *lee-shore* is a shore to the lee of the vessel, a shore therefore upon which the wind is driving the vessel with all its force; and in a storm it sometimes proves impossible to escape this great danger. Most wrecks occur upon a lee-shore.

Lee-way is the amount of a ship's drifting out of her direct course to leeward under the pressure of the wind. It is evident that a heavy wind will drive the ship bodily from her course even without twisting her hull round, and even a light wind has a certain effect. In all computations of sailing due allowance is therefore made for lee way. The amount made depends very largely upon the lines on which the ship is built.

LEE, NATHANIEL, like his brother-dramatist Otway, was the son of a parish clergyman. Between them this pair gave whatever of the higher character, of imagination, and of dignity is to be found in the later Stuart drama. Lee was born in the parsonage of Hatfield, 1650, and educated at Westminster School. When about twenty, after a short university course at Cambridge, where he graduated B.A. in 1668, he took to the stage, acting in revivals of Shakspeare, but making no way. In 1675, the same year as Otway, he produced his first drama, "*Nero*," and in the fifteen years of life which remained to him he wrote ten more. He also worked occasionally with Dryden. The best are "*The Rival Queens*" (1677) and "*Theodosius*" (1680). Lee has great gifts of imagination and passion, and had lived among the Elizabethans would no doubt have produced fine work. From 1684 to 1688 he was insane, but began writing again in 1688. He died in poverty in 1690. Like so many men of genius Lee was over-fond of the bottle; the reaction from efforts of a vivid imagination like his must be pleaded as a sore temptation.

LEE, ROBERT E., General and Commander-in-chief of the Confederate army during the Civil War in America, was born in Virginia in 1810. His family had been eminently distinguished in America ever since their ancestor, Richard Lee, emigrated thither in the reign of Charles I. Robert Lee was educated at the military academy of West Point, entered the army of the United States, served as captain of engineers under General Scott in the war with Mexico, was raised to the rank of lieutenant-colonel, and breveted colonel for distinguished services. He was employed in the office of the commander-in-chief at Washington when Virginia seceded from the Union. April, 1861, when he resigned his commission, and was appointed commander-in-chief of the forces of Virginia. When that state entered the confederacy he was appointed to its highest military rank of general, and though not the senior, was selected by President Davis as commander-in-chief. In July, 1862, he defended Richmond against the Federal army under General McClellan, and after six days of sanguinary battles, drove him to the shelter of his gunboats. Marching north, he defeated General Pope in the second battle of Manassas. Crossing the Potomac into Maryland, with a force of 40,000, he was met at Antietam by General McClellan with 80,000, and after a bloody but indecisive conflict recrossed the Potomac, and took a position at Fredericksburg, on the Rappahannock, where he was attacked by General Burnside, whose army he defeated with great slaughter. General Hooker, the successor of Generals McClellan, Pope, and Burnside, whom Lee had successively defeated, crossed the Rappahannock 1st May, 1863, and was attacked by General Lee on the 2nd and 3rd, routed with heavy loss, and compelled to escape in the night across the river. From August, 1863, till May, 1864, General Lee was engaged in operations on the line

of the Rappahannock, and defeated General Grant in the Wilderness on 5th May, 1864, but on account of the insufficiency of his forces retired on the James River on 7th and 8th May. From that time till April, 1865, he held the defences of Petersburg and Richmond, fighting several battles. After a most heroic defence he was driven from Petersburg on 2nd April, and surrendered with his army on 9th April. On 2nd October, 1865, he was installed president of the Washington Military College at Lexington, Virginia, and died there on 13th October, 1870.

LEECH (*Hirudinea*) is an order of ANNELIDA. The Medicinal Leech (*Hirudo medicinalis*) is the best known of this order. The body is soft, retractile, and segmented like that of an earthworm, but the segmentation cannot be made out on the exterior. The surface is marked by about ninety-five superficial rings, of which generally five comprise one segment, as indicated by the internal organs. The leech has no lateral appendages of any kind, but at either termination of the body there is a sucker, the mouth taking part in the anterior. Within the mouth are three muscular cushions, on which are mounted numerous teeth of calcified chitin; the meeting of these three cushions with their teeth causes the well-known triradiate wound. The mouth leads into a powerful sectorial pharynx, which is provided with salivary glands. The pharynx leads into an intestine which gives off on each side eleven pairs of lateral pouches or cæca, which gradually increase in size from before backwards, the last pair being very long and reaching almost to the end of the body; between them the intestine is continued as a small tube, and ends in an anus, which opens on the back immediately in front of the posterior sucker. The circulatory system consists of four main longitudinal trunks, dorsal, ventral, and two lateral. The lateral trunks have muscular contractile walls, and bring the other trunks into connection by means of a fine system of capillaries, which are also distributed to the muscles and other organs. The ventral sinus incloses the nerve-cord. The blood is a red fluid, coloured by hæmoglobin, and contains colourless corpuscles. The nervous system is well developed. There is a large cerebral ganglion, from which proceed two cords, forming a ring round the œsophagus, and meeting in a large sub-œsophageal ganglion. The two cords lying side by side are continued throughout the body, having a ganglion in every segment. There is evidence that the first ganglion below the mouth is composed of three fused ganglia, and the last of seven; so that this goes to prove that the leech's body is built up of thirty-two segments. There is an azygos nerve running along the ventral surface of the digestive tract.

The leech has seventeen pairs of *nephridia* or excretory organs lying in the region between the second and the nineteenth nerve ganglion. They are tubes which open externally on the ventral surface of each segment; within each forms a coil which appears to open by a small aperture in a sinus of the vascular system which surrounds the testis. On the anterior segments of the body are found cup-shaped depressions of the skin surrounded by numerous pigmented cells. These receive each a nerve from the cerebral ganglion. In some of these epidermic follicles a clear secretion is formed, acting as a lens; such form eyes of a very simple character. Those follicles in which the lens is not present are organs of some sense, probably of taste. The epidermis of the leech gives rise to a horny cuticle devoid of colour. Many of the epidermic cells are modified as glands, which perforate the cuticle; some of these glands are of considerable size, pushing down close to the intestine. The muscular system is well developed, consisting of circular, longitudinal, and radiating layers. The interspaces are filled up by connective tissue, quite obliterating the body-cavity.

In the leech the sexes are united in the same individual, but self-fertilization never occurs. The male and female apertures are single, situated in the anterior part of

the body, and open in the middle line on the ventral surface—the male aperture being in the segment in front of the female. The eggs are invested before extrusion with an albuminous secretion, and are then inclosed in a cocoon formed by a viscid secretion of the integument. These cocoons contain from five to eighteen eggs, and are deposited in the clay and holes of the sides of the ponds during summer and autumn. As the egg contains a considerable amount of food-material cleavage does not take place very rapidly. The small cells which are to constitute the epiblast grow over the larger hypoblast cells, and the mouth is formed. The body elongates, and the middle layer or mesoblast appears, subsequently breaking up into segments. At the hinder end of the body three pairs of large nephridia make their appearance, persist for a time, and then disappear. The mouth and pharynx are formed from the outer layer or epiblast.

About three years are required before the leech has attained maturity and is fit for medicinal purposes. The young at first feed on microscopic organisms, subsequently attacking the larvæ of insects and even small fishes and frogs. As they get older they attach themselves to mammals and other animals. They can live for a long time out of the water in damp places. They swim with a vertical undulating motion. On land the leech can progress after the manner of the "looping" caterpillars (*Geometridæ*), by alternately attaching one or other of its suckers to any surface, and expanding and contracting its body.

The ancients appear to have known only the most common species of leech. Aristotle makes no mention of them, and they do not appear to have been used in medicine in the time of Hippocrates. Pliny describes them very clearly under the names of *Hirudines* and *Sanguisugæ*, and Galen and his successors recommended their use in surgery.

An enormous demand sprang up for leeches for surgical purposes at the end of last century, which caused their natural haunts in the swamps and marshes to be invaded by armies of collectors, who soon denuded them of their ordinary stock. The comparative rarity of leech-production in England is chiefly owing to this draining of the ponds and bogs in which they formerly abounded, and British supplies are now mostly derived from France. The French seem particularly partial to leeches, and their use in that country has always been more general than elsewhere. As a consequence of the drain upon her supplies, she was the first to suffer from a diminished yield, and for a long time, independent of its own production, the annual importation into France amounted to 50,000,000. In time the leech-famine spread to Hungary, Turkey, Greece, and Germany, and soon to Algeria and Spain, all of which countries were ransacked in the search for these bloodthirsty creatures. The scarcity and dearthness of leeches at last attracting attention, the idea was conceived by a Frenchman that they might be kept in regular farms and bred, just like any other animal for which there is a steady market. The idea was soon carried into practice, and with such success that leech-breeding has come to be regarded as a distinct industry of no little importance, and is carried on to a considerable extent in different parts of the Continent. Their use in medicine is now dying out.

There are two well-marked varieties of the medicinal leech which are used in England; by some they are considered sufficiently distinct to form two species. *Hirudo officinalis* has a green or light blackish green body, the back marked with six longitudinal bands of an iron colour, spotted with black spots at their middle portion and edge. The belly is of a yellowish-green without spots, but broadly bordered with black. The segments of the body are very smooth. It is large, often 7 inches long, and lives in pools and rivers.

Hirudo medicinalis has the body of a deep green, its back marked with six longitudinal bands of an iron colour,

pretty clear, spotted with black points, generally triangular. The belly is greenish spotted, and broadly bordered with black, and the segments of the body rough from granular eminences. It inhabits ponds and small lakes.

Leeches are caught in various ways—by the hand, or by a person wading in the shallow waters during the spring of the year, when they adhere to his naked legs; but in summer, as they have retired to deeper waters, a raft is constructed of twigs and rushes, by which a few are entangled. Baits are deposited, generally pieces of decayed animal matter or liver, to which the leeches resort, and are then caught; but this last method is thought to injure the health of the animal. Many sicken and die on the journey, especially during warm weather. They are conveyed either in bags or small barrels with a canvas cover.

A leech may be known to be in good health if it be active in the water and plump when taken out. Leeches vary in the quantity of blood they can abstract, from one drachm to half an ounce; from one to two drachms is the average. The quantity is often doubled by the expedients resorted to after the leech has been removed, either dry or wet cloths being applied, or in many cases, cupping glasses; but cataplasms of linseed meal are most beneficial where they can be applied.

One gray or German leech is deemed equivalent to two green or Hungarian leeches. In applying leeches it should be borne in mind that certain states of the patient hinder or indispose them to bite. When the skin is very thick they cannot puncture it, or if the person has been using sulphur the exhalation of the sulphuretted hydrogen is disagreeable to them; even the fumes of tobacco, vinegar, &c., will prevent them biting; also, if grease, salt, or vinegar be on the spot to which they are applied, they refuse to attach themselves to it. The existence of hairs on the spot seems to hinder them from biting, and also from forming a vacuum to suck up the fluid, on which account they should be carefully shaved off. The leeches should be taken out of the water, and allowed to creep for some time over a dry warm cloth; various applications are recommended to induce the leech to bite on a particular spot, such as milk, porter, &c. They may be preserved for subsequent use by placing them in vinegar and water, and then in a vessel containing moist turfy earth.

Should there be any difficulty in stopping the flow of blood when the leech is removed, a weak solution of creosote applied to the part will generally effect it, or felt scraped from a hat, or gum in powder, or flour, or the dust of the puff-ball, or the application of a compress and bandage, tying a ligature, or touching the wounds with lunar caustic. The patient should at the same time drink a saturated solution of alum, or take dilute sulphuric acid.

The order Hirudinea may be divided into three families, Gnathobdellidae, Rhynchobdellidae, and Branchiobdellidae. The first of these families contains the medicinal leech and its allies. Two species of leech have had the name house-leech applied to them. One of these, *Aulostomum gulo*, is abundant in ponds in England; it has no jaws, but swallows larvæ, worms, &c. The second species of house-leech is *Hamopsis vorax*, which attacks horses and cattle when drinking. A gigantic leech, *Macrobdella dalli-rana*, is found in South America; it has no eyes, lips, nor teeth; it lives probably in damp earth, feeding on earthworms. The family Rhynchobdellidae is remarkable for having the pharynx eversible. Most of these forms are fish-leeches, parasitic on different kinds of fish, both fresh-water and marine. In the genus *Clepsine* the ventral surface of the body posteriorly forms a kind of pouch, in which the eggs are hatched, and to which the young remain clinging for some time. The Branchiobdellidae include some leeches parasitic on the crayfish, lobster, and other crustaceans.

LEECH, JOHN, a celebrated humorous artist, was born in London, 29th August, 1817, and was educated at the Charterhouse, where his friend Thackeray was his older schoolfellow. He inherited from his father a natural ability for drawing, and it is said that the sculptor Flaxman, on seeing one of his infantile sketches produced at the age of three, predicted his future ability. At the age of sixteen he began to study medicine, but finding it out of harmony with his inclinations, he gradually drifted into the artistic profession. His first production, entitled "Etchings and Sketchings by A. Pen, Esq.," four pages of character studies from the London streets, appeared when he was at the age of eighteen, and he soon afterwards began to work for the magazines. His first productions display the influence of Cruikshank and Hablot Browne, but he soon developed a characteristic style of his own, in which he afterwards reigned without a rival. In August, 1841, in the fourth number of *Punch*, he commenced his connection with that periodical, and his best works appeared in unbroken series up to the issue of the 1217th number, in which his last design was published after his hand had forgotten its cunning for ever. For twenty-three years the congenial task of furnishing a weekly supply of wit and gentle satire was successfully undertaken by Leech. Several thousand sketches, as full of grace as of humour, furnished the public with food for laughter, and occasionally with material for serious and kindly meditation, and their popularity is shown by their success when reissued in folio volumes, each containing some 500 woodcuts, under the title of "Pictures of Life and Character," of which several series have been published. The chief objects of his satire were the vagaries of male and female attire, the precocity of the young, the relations between husband and wife in the management of household affairs, the vagaries of domestic servants, and the foibles of the lower orders. His hunting and fishing sketches, from their spirit and truthfulness, may be said almost to form a separate department of his work, and perhaps of even greater value are his occasional touches of pathos and pity, which show his sympathy with the poor and the neglected. As an artist he was indefatigable, and his facility of hand enabled him to produce his sketches with wonderful rapidity. No phase of life escaped his notice, and he depicted with equal skill the style and manners of the upper classes of society, and the humours of the ragged urchins of the street. In addition to his work for *Punch*, he illustrated several of the works of Albert Smith and Gilbert A'Ricket, as well as Blaine's "Encyclopædia of Rural Sports." He also contributed to the *Illustrated London News*, and to numerous separate volumes and novels. In private life he was kind, manly, and hospitable, a fine specimen of the English gentleman, and he was respected and loved by a large circle of friends. He died 29th October, 1864. See "John Leech" by Dr. John Brown, *North British Review*, March, 1865, republished with additional chapters by Canon Hole in Dr. Brown's Essays (1882).

LEEDS, the commercial capital of Yorkshire, and the principal emporium of the English woollen manufacturing trade, is a place of considerable antiquity, being the *Loidis* of the ancient Saxons. It is a municipal and parliamentary borough, the municipality consisting of sixteen wards (up to 1881 the number was twelve) governed by a corporation of sixty-four—sixteen aldermen and forty-eight councillors. It was first incorporated in 1626; and the Reform Act of 1832 constituted it a parliamentary borough with two members, which number was increased to three by the Act of 1867. By the Redistribution Act of 1885 Leeds was divided into five wards for parliamentary purposes, each of which returns one member. The estimated population in June, 1885, was 333,139, and the estimated number of houses was 70,000. The

census of 1881 showed the population to be 309,126, occupying 65,034 houses, that of 1871 a population of 259,201, inhabiting 55,943 houses, and that of 1861 207,165. The rateable value in 1885 was £1,166,796, against £1,096,019 in 1880.

Leeds is 22 miles S.W. of York, and 185 N.N.W. of London; 9 from Bradford, 9 from Dewsbury, 30 from Doncaster, 18 from Harrogate, 15 from Ilkley (both these latter are residential resorts for well-to-do Leeds business and professional men), 17 from Halifax, 17 from Huddersfield, 74 from Scarborough, 39 from Sheffield, and 10 from Wakefield. It is situated on the slope and partly on the summit of a hill, which rises from the north bank of the Aire, and from the top declines to the east, west, and north. It is of great extent, covering an area of 21,572 acres, and being about $7\frac{1}{2}$ miles across from east to west, and 7 miles from north to south. The boundaries of the old parish and the parliamentary and municipal borough are identical. Within them are comprised four poor-law unions—those of Leeds, Holbeck, Hunslet, and Bramley—but the local Government Board has under consideration a scheme for merging the other three unions into that of Leeds, and in this manner forming one poor-law authority for the whole borough. The corporate administrative offices and the commercial centre of the town, as well as its better-class population, are found on the north side of the river, but the vast industrial establishments and working-class element preponderate on the southern side. The two sides of the river are connected by seven bridges, the most recent of which is one connecting the townships of Armley and Leeds, built at a cost of £20,000, the explanation of this large sum being that the work involved, besides the main bridge, a bridge over the canal and a viaduct of fourteen arches. Another bridge in Whitehall Road has been replaced in iron at a cost of over £5,000. A handsome structure is the iron bridge, of a single span, erected at the bottom of Briggate in 1873, to replace a well-known structure which had existed nearly 500 years, and upon which the cloth-dealers of a couple of centuries ago used to display their wares.

Situated in the very midst of a large colliery district, and favoured with quite exceptional accommodation in the matter of carrying facilities both by rail and water, it is not surprising that Leeds has gained its high importance as an industrial centre of most varied and extensive interests. The Wellington Station of the Midland Railway Company adjoins the magnificent joint station of the London and North-western and the North-eastern companies, completed in 1867; while the Great Northern and the Lancashire and Yorkshire companies share the Central Station, into which the Manchester, Sheffield, and Lincolnshire Company also runs. Then the Aire and the Leeds and Liverpool Canal—which have direct communication—give water communication respectively with Hull on the east and Liverpool on the west coast, so that there is abundant outlet for the products of the innumerable industries of the town. Of these the chief is the manufacture of woollen cloths. Meltons, tweeds, and mantle-cloths of all descriptions are produced in vast quantities, in addition to the plainer description of goods; while of what are called *superfine cloths*, Leeds manufactures a larger quantity than any other district in Europe. The manufacture of woollen caps has also become an important branch of business; and, like the ready-made clothing trade, gives employment to thousands of people. Two other industries have also assumed gigantic dimensions of late years—viz. the iron and engineering branches, and the leather trade. The iron-foundries are large and busy places, and there are extensive manufactories of locomotive and other steam engines, railway plant, machine and engine tools, small arms and munitions of war tools, nails, bolts, &c. The importance of the leather trade is seen in the huge tanneries

at Buslingthorpe, Joppa, &c., where between 3,000,000 and 4,000,000 hides are tanned every year. Leeds is now one of the largest plain and fancy leather producing districts in the world. The manufacture of ready-made boots and shoes is also a leading industry. The flax trade, which was formerly one of the staple trades of the town, has diminished of late years, but still yields considerable employment. The other leading manufactures include worsted stuffs, carpets, canvas, sacking, and ropes; and there are very extensive dye-works, flax-mills, and thread-mills; glass-works, sanitary tube and fire-brick works. The felt, carpet, and drugging production is now a large one, and there are a number of chemical works. The tobacco manufactories are among the largest out of London. The oil and seed-crushing trades are also of much importance; and there are large steam flour, saw, and paper mills, and paper-staining works, vinegar manufactory, extensive breweries, &c.; while the pottery trade, for which Leeds has been distinguished for a considerable period, has lately undergone a revival of a gratifying and artistic character.

The places of worship in the borough are very numerous. St. Peter's, or the parish church of Leeds, is the chief of the fifty-seven Church of England establishments. It is a noble edifice, seats 4000 people, and cost £40,000. There is full cathedral service daily, and the organ, which has been reconstructed, is one of the finest instruments for ecclesiastical purposes in the whole country. Leeds has had only twelve vicars in over two centuries, and all have been men of commanding position; we may cite the names of Dr. Cooke, Dr. Hook (better known as Dean Hook), Dr. Woodford, and Dr. Gott. The Catholic community have nine places of worship, including St. Ann's Cathedral (Leeds having a Roman Catholic bishop); the Wesleyan Methodists have thirty chapels; the Methodist Free Church, twenty-two chapels; the Methodist New Connection, eleven; the Primitive Methodists, twenty-six; the Independents, eleven and five mission chapels; the Baptists, fifteen; Congregationalists, twelve; Unitarians, three (one of which is a leading architectural feature of the town); Presbyterians, two; Quakers, two; Jews, two; Swedenborgians, one; while the Plymouth Brethren, the Mormons, the Catholic Apostolic Church, the Christadelphians, and the "Second Advents" also have places of worship in the borough. The first dissenting chapel was erected in Leeds in 1673. There are nine cemeteries in the borough, three of which belong to the corporation.

The most important of the public buildings of the town are the Town-hall and the new Municipal Buildings, opened towards the end of 1884, and erected in consequence of the municipal business outgrowing the accommodation in the Town-hall. The latter cost £140,000. It is a handsome Corinthian pile, 250 by 200 feet, with a dome 250 feet high, opened by the Queen in 1858, and in the vestibule of which stands a statue, in white marble, of her Majesty, presented to the town by the late Sir Peter Fairbairn, and one of the Prince Consort. It includes a hall 161 feet long, with one of the finest and best organs in Europe, and statues of the late Edward Baines, Esq., M.P., and Robert Hall, Esq., M.P. In 1885 there was placed in the building a painting by Mr. Oulless, R.A., of Sir Edward Baines, a former member of Parliament for the town, long associated with its political and social life and progress, the portrait having been subscribed for by his fellow-townsmen. The Municipal Buildings front to the east side of the Town-hall, and form a superb companion block. Their cost exceeded £100,000. They are built in the Palladian style, and the interior is marked by much splendour. The main entrance portico is flanked by a double row of granite columns, highly polished, and leads to a vestibule 23 feet square, richly ornamented with Devonshire marbles of various colours, pillars, vaulted roof, and mosaic flooring.

This gives entrance to an inner hall, elegantly and ornately decorated, whence access is had to the various offices. But the most sumptuous part of the building is that devoted to the Free Public Library, which occupies one wing of the structure. The reading-room is 80 feet long by 40 wide, divided into a broad nave and aisles by six arches carried upon polished granite pillars supporting the roof, which is formed of segmental vaults of mosaic work in many-coloured hexagonal bricks, set off by golden bosses. The walls are tiled with richly-hued and contrasted squares, while at intervals appear medallion busts of Shakspeare, Homer, Dante, Milton, Goethe, Scott, and others. The room above this is the lending library, and here terra cotta takes the place of granite; while on the third floor is the reference library, with accommodation for 100,000 volumes—a superb apartment. The library is illuminated by the electric light. Associated with the Free Library are twenty-one branches in the borough; the total issues number nearly 700,000 volumes per annum, of which 275,000 are issued at the Central Lending Library. The total volumes in the libraries number 130,000, of which 31,000 are in the Central. The reference library contains 32,000 volumes, and the annual issues are nearly 80,000. In connection with the library free fine-art exhibitions are promoted by the corporation.

In close proximity to this erection are the School Board offices, which harmonize in appearance, and the cost of which was £28,612. The board has about forty permanent schools in the borough, which have cost about £302,000, and accommodate 28,935—or at the rate of £12 10s. 1d. per head, including cost of sites. The board has an industrial school just without the town, accommodating about 200 boys, and which cost £15,419; also a day industrial school. The commercial buildings comprise the Corn Exchange, opened in 1863, built in the form of a Roman theatre, oval in plan, 190 feet by 136, and 86 feet high; the Royal Exchange, late Gothic in style, the foundation stone of which was laid by the Duke of Connaught, and which was opened in 1875; a handsome branch of the Bank of England, and ten other banks; the Stock Exchange; the White Cloth Hall, rebuilt in 1868 for £30,000, having a saleroom containing 1250 stalls; and the Coloured Cloth Hall, 383 feet by 198, inclosing 1780 freehold stands. The modern conditions of trade have rendered the cloth halls almost useless, and the corporation has long been anxious that part of the estate of the Coloured Cloth Hall should be secured for the purposes of a post office, the present building, which was purchased in 1862 for £6000, having long been inadequate.

The Smithfield Cattle Market of 5 acres, formed in North Street in 1854, was in 1885 superseded by a new market and abattoirs on the south side of the river, covering 16 acres, which was constructed at a cost of over £50,000. It is the largest market of the kind in the north of England, and accommodates 21,000 sheep, 1300 calves, 3600 beasts, and 3100 pigs. The other markets include the Kirkgate covered and open markets; the Central Market, built at a cost of £35,000, and since enlarged; and the South or Leather Market. There is a well-equipped fire brigade station near the town hall, and the gaol at Armley is a sombre-looking but imposing castellated stone structure, which cost £160,000. The Leeds Infirmary (founded in 1767) and Medical School, from designs by Sir G. G. Scott, were opened by the Prince of Wales in 1868, having cost £106,000, and in connection with the occasion an Art Treasures Exhibition was held in the building with great success. It is built on the principle of separate pavilions, so as to obtain as much quiet and free air as possible, and is considered one of the most complete institutions of the kind existing. There are also in the town an Hospital for Women and Children, an Eye and Ear Infirmary and Dispensary, the Fever Hospital (transferred

to the corporation as an hospital for the treatment of infectious diseases), and a School of Medicine of high repute, which has been affiliated to the Yorkshire College. The Leeds medical charities have derived great aid from the Leeds Triennial Musical Festivals, which also do so much to advance the cause of music, as the works of the greatest musical masters as well as of distinguished contemporary musicians are performed with exceptional completeness. The first festival was held in connection with the opening of the town-hall in 1858, but the triennial gatherings were founded in 1871, and from the profits of this and the three subsequent festivals a sum of £8000 has been distributed among the Leeds medical charities. There are two theatres, neither very attractive externally, but internally very handsome; cavalry barracks, with a parade ground occupying 11 or 12 acres; three volunteer and one militia barracks; and some fine hotels, particularly those adjoining the stations. The Free Grammar-school was founded in 1552, and rebuilt in 1869, at a cost of £15,000. It has a revenue of nearly £1700 a year and some good scholarships. The town also contains Harrison's, St. John's, and many other schools; Harrison's, Potter's, and Jenkinson's almshouses; Burnanotto's industrial schools, in the Elizabethan style, 276 feet long; new workhouse, a magnificent and extensive building also in the Elizabethan style, with room for about 800 inmates; and mendicity institution.

The chief institutions at Leeds for supplementary education are the Leeds Philosophical and Literary Society, the Literary Institution, and the Working Men's Institute. The Philosophical Society's Hall is a handsome building, of the Doric order, and has a spacious lecture theatre and fine museum. The Yorkshire College, erected chiefly by the Clothworkers' Company of London, was opened in 1880. It is built on an estate covering $3\frac{1}{2}$ acres, and several portions of it are supported and endowed by the company named. It is now affiliated with the Owens College University at Manchester. Its textile industries and dyeing departments are especially complete and efficient. The Literary Institution has a large reading room and extensive library. A large and imposing edifice was opened in 1868 for the Leeds Mechanics' Institute and School of Art. It is Italian in style, contains a noble circular lecture hall—the Albert Hall—75 feet in diameter, accommodating an audience of 1500; a picture gallery 83 feet by 30, and large painting, architectural, modelling, science, and classrooms. The institute has a library of 21,000 volumes, reading-room, day schools and evening classes, and about 1600 members. In connection with it is one of the most successful schools of art in the kingdom, giving instruction in drawing to 668 persons. The Church Institute is a goodly building whose object is to unite churchmen in the endeavour to extend education according to the principles of the Establishment. It contains a library of 8000 volumes, a large lecture hall, reading-room, &c., and has lectures and classes. The Working Men's Institute has about 2000 members. There are several Flonies—that established by Dr. Priestley being one of the best in the north of England.

Formerly Leeds had an uninviting appearance, and the older streets, Kirkgate, Briggate, and some others, are still narrow and inconvenient; but the modern thoroughfares are good and spacious. The latest improvement of note is the widening of Duncan Street to a width of 60 feet, which renders it uniform with the improved Boar Lane, of which it is a continuation. The district on the west is new, and inhabited by the wealthier classes. The population on this side is increasing very rapidly, and new streets and roads are being set out by most of the owners of property in this locality—Headingley and Burley being the most growing districts. At Headingley the church has been enlarged, and a parochial institute erected. In the commercial

and street architecture of Leeds a considerable advance has been made, most of the recent structures being in one or the other types of Gothic or Italian, and constructed of stone or moulded or coloured brick. Some of the banking and club houses of the borough are of a very superb construction.

Interesting relics of old Leeds are afforded by Adel Church, built in 1140; Kirkstall Abbey, built by Henry de Lacie in 1150, for the Cistercian order of monks, and now a fine ruin, remarkable for its simple grandeur and unity of design; by the Red Hall, now a lawyer's premises, but where Charles I. took refuge from his pursuers; and by an inn, formerly Wade Hall (so called after a Parliamentary general who camped near it). Not far from the town are the celebrated mansions of Templenewsam and Harewood House. In the approaches to the town many handsome villas have recently been erected, and in the suburb of Cookridge a convalescent home was erected in 1869 by Mr. J. M. Smith, in memory of his father, at a cost of £10,000. At Headingley the Wesleyan Methodists erected in 1869 a new theological college, to accommodate forty students.

Roundhay Park, which the corporation purchased in 1871 for £140,000, and which was opened in 1872 by Prince Arthur (now the Duke of Connaught), is a noble estate park containing 300 acres, including two beautiful lakes. It is 3 miles from the town. There are also recreation grounds at Woodhouse Moor, Woodhouse Ridge, Bramley, Holbeck Moor, Hunslet Moor, and Wortley, besides one at the east end of the town, known as Paddy's Park. There are some fine horticultural gardens (private) adjacent to Woodhouse Moor.

The whole borough is sewered. There are about 245 miles of sewers, provided at a cost of £501,000. The sewage works at Kestrop have cost £57,524, and are considered exceptionally efficient. The daily flow of sewage is 10,000,000 gallons.

The gas and water supplies are both in the hands of the corporation, and are gigantic undertakings. The cost of the gasworks up to the present time exceeds £1,000,000. The corporation have for several years been engaged in carrying out a very extensive scheme of water-supply, which will still require some years for its completion. By it the entire valley of the Washburn, a picturesque tributary of the Wharfe, will eventually be converted into a series of reservoirs. They have now four storage reservoirs holding 3,575,000,000 gallons, and have further the power of pumping 6,000,000 gallons daily from the Wharfe. The great reservoir at Eccup will hold water for five or six months' consumption, if not another drop entered from the pumping or gravitation system. The cost of the water-works up to the end of the 1884 financial year was £1,523,520.

In 1864 Leeds was made an assize town. It is the seat of a district court of bankruptcy, and of a county court. It is also a warehousing town under the Inland Baring Act of 1860.

LEEDS, DUKE OF. See DANBY.

LEEK, a market-town of England, in the county and 23 miles N. by E. from Stafford, 28 miles S. from Manchester, and 157 N. by W. from London, by the North-Western Railway, is situated on an eminence. The streets are paved and the houses well built, and there is an excellent supply of water. The parish church, an old building having a tower with eight pinnacles, was thoroughly restored in 1875, and a chancel and south aisle added, and some half-wood painted windows inserted. In the churchyard is a pyramidal cross, supposed to be Danish. There is another church and several dissenting chapels, some of the latter being handsome structures. The town also contains a mechanics' institute, temperance hall, several educational establishments and benevolent institutions, a cottage hos-

pital erected in 1870 in memory of J. Alsopp, Esq., and a town-hall erected in 1874. The principal manufactures are those of twist, ribbons, and sewing and other silks. Near the town is an abundance of good coal. The population of the parish (which comprises ten townships, and covers 34,370 acres) in 1881 was 16,210; of the town, 12,563. Roman and British remains have been found, and in the vicinity there are some ruins of a Cistercian abbey erected in 1214. The town was occupied by the Pretender in 1745.

LEEK, a plant which was known to botanists as *Allium Porrum*, but has been shown by Gay to be only a cultivated variety of the wild plant *Allium Ampeloprasum*. It is certain that the leek has never been found in a wild state, but *Allium Ampeloprasum* is indigenous in the East and the whole Mediterranean region, especially in Algeria. The cultivation of the leek is of great antiquity, for it was practised by the ancient Egyptians, and Nero was derisively named "Porrophagus" (Leek-eater), from his custom of eating them to make his voice clear. It was probably introduced by the Romans into Britain; for though the wild form is found in Guernsey its presence on Steep Holmes Island in the Severn is due, according to Babington, to the remains of former cultivation. It is largely used at the present day in all parts of the British Isles, the part preferred being the lower part of the stem together with the sheathing portions of the leaves, which are blanched by earthing up. Leeks should be sown in March in a bed of rich earth. If they are to remain in the same bed they should be sown in drills 18 inches apart, but if they are to be transplanted they may be sown moderately thick. Transplanting is necessary if it is desirable to have them of good size; June is the best month for this operation. The plants should be placed in rows 15 inches asunder, and 9 inches apart in the line. The ground should be rendered exceedingly rich by the application of good manure. The holes should be made large, and only sufficient mould dropped in to cover the fibres.

LEET COURTS, in English law, are courts of record held once a year within a particular hundred or manor before the steward of the leet. At it petty offences are presented and punished. Formerly courts-leet were held in all manors whose lords had *sac* and *soke* rights (rights of holding courts and jurisdiction), but they are now held in few, and yearly fewer, places. The title of the court as a "view of frank-pledge" points to its former importance, under the system of police introduced or perfected by King Alfred, which required that all freemen above twelve years of age should be received into a decenna, dizain, decennary, or tithing, sometimes called a visne, or neighbourhood—in Yorkshire and other parts of the north, ten men-tale (a number, tale, or tally of ten men)—and forming a society of not less than ten friborgs, or freeborrows, freemen, each of whom was to be borluc, that is, pledge or security for the good conduct of the others.

Leets were either public or private. The public leet was practically the **FOLKMOORE**. The private courts-leet appear to have been created by grants from the crown, obtained by the owners of extensive manors, and most frequently by religious houses, for the purpose of relieving their tenants and those who resided upon their lands from the obligation of attending the hundred-mote by providing a domestic tribunal, before which they might take the oath of allegiance, and the frank-pledges might be inspected.

The court-leet is a court of record, which has jurisdiction of such crimes as subject the offenders to punishment at common law. As criminal jurisdiction belongs exclusively to the kingly office, all criminal prosecutions are called pleas of the crown, and the court in which such pleas are held are the king's courts, although granted to a sub-

ject. The authority so exercised under the king's grant is called a lordship, and the grantee is said to be the lord of the leet. It may be claimed either by a modern grant or by prescription, that is, long-established usage, from which an ancient grant is presumed.

Private leets are commonly held twice in the year: within a month after Easter, and within a month after Michaelmas. The court appears to have been formerly held in the open air. It should be held at its accustomed place, though if sufficient notice be given, it may be held anywhere within the district. All males (with a few exceptions) above the age of twelve years and under sixty within the precinct owed suit (*i.e.* personal attendance) at this court.

It was the province of the court-leet, as well the public leet of the hundred (hundred-mote), as the private leet, to repress all offences against the public peace, and to enforce the removal of all public nuisances. Before the Norman conquest, and probably for some time after, this court of the leet was, if not the sole, at least the ordinary tribunal for the administration of criminal justice throughout the kingdom.

The ordinary profits of a court-leet are the fines, amercements, and essoin-pence, and belong, in the case of a public leet, to the king; in the case of a private leet, to the grantee or lord of the leet. Though the court-leet may now be considered as an antiquated institution in many respects, it is characterized by many valuable features, and in some districts is still efficient.

LEEWARDEN, the chief town of the Dutch province of Friesland, situated 32 miles W. of Gröningen, has 29,000 inhabitants. It is surrounded with an earthen rampart and a wide moat; the broad straight streets are intersected by canals, the banks of which, as well as the ramparts, are planted with trees, and afford very pleasant promenades. The town, which is well built, has manufactures of linen and paper, sewing machines and safes; iron foundries, copper and lead works, printing establishments, and a considerable trade, which is much facilitated by numerous canals. The principal buildings are—the town-hall, the ancient palace of the princes of Orange, a synagogue, and twelve churches, the largest and handsomest of which contains monuments of the princes of the house of Orange. There are also an arsenal, exchange, house of correction, and a branch of the Society of Public Good. Leeuwarden is on the railway between Harlingen and Gröningen. Owing to its history and the character of its buildings, Leeuwarden has been frequently called the Frisian Hague. It dates as a town from 1190, and played a great part in Frisian history during the fifteenth and sixteenth centuries.

LEEUVENHOEK, ANTONY VAN, the first great microscopist, was born at Delft in Holland in 1632. He does not seem to have had the advantage of a learned education. His researches gained him the notice of the Royal Society of London, and his works all appeared in the *Transactions* of that body. He was chosen a fellow of the Royal Society in 1680. The Academy of Paris also elected him a member in 1697. Leeuwenhoek contributed no less than 112 papers to our Royal Society. He usually worked with simple microscopes, as the compound microscopes of his day had not been achromatized; and his chief studies were anatomical. It was in a memoir presented to the Royal Society in 1690 that this great observer first demonstrated the fact of the capillary circulation, a point which Harvey had had to leave unproved in his great theory of the circulation of the blood. And it was in another memoir that the existence of Infusoria was first shown, more especially of the Rotifer or wheel-animalcule. It may be fairly said that Leeuwenhoek is the father of microscopic research, which has been conducted, though with vastly improved instruments, mainly on the lines he laid down. Leeuwenhoek's works were collected and

printed in Dutch at Delft, in seven volumes, the last appearing in 1732; in Latin at Leyden, 1792; in English (*trs.* Hoole) in 1880.

LEEWARD ISLANDS or **GREATER ANTILLES**, a name commonly given to the West Indian Islands north of 80° N. lat., and comprising Cuba, Isla-de-Pinos, Hayti, Puerto Rico, and Jamaica. The name is now restricted to the British possessions of Antigua, Montserrat, St. Kitts, Nevis, Dominica, Barbadoes, Anguilla, and the Virgin Islands, which were constituted a single federal colony by the 34 & 35 Vict. c. 71, passed in 1871. The government is vested in a general legislative council and in a governor appointed by the crown.

LEG. The lower limbs of man, or legs, depend from the pelvis or hip girdle, which has been elsewhere described [*see* **BAC K-BONE**]; and are divisible into thigh, leg (or lower leg), and foot. Of these, the **FOOT** is elsewhere described. The present article deals with the leg proper. The illustrations in the Plates accompanying the article give a thorough view both of the bony and muscular structure of the leg.

The great bone of the leg is the thigh-bone or *femur* (Plate I. fig. 1 is a front and back view), the largest bone in the body. It is cylindrical, slightly curved forwards; its fore part, *a*, very smooth, its hinder surface, *b*, pinched up to the ridge of the *linea aspera*, which at once supports the curve of the bone and increases the surface for muscular attachment. At each end the bone swells out. Above is the *great trochanter*, *c*, a strong process; and about 2 inches below this, and to the inner side, is the *little trochanter*, *d*, to which are attached the great muscles which bring the thigh forward on the trunk in progression. Between these the neck of the bone, *e*, curves inward, terminating in the large rounded head, *f*, which is inserted in the deep socket of the hip. The general attachment is shown in the large figures of the lower part of the skeleton, and the position of the thigh is there seen not to be vertical, but considerably inclined inwards, so as to bring the knees together.

The lower end of the thigh-bone also expands, forming two large condyles, *g*, *h*, the inner being the larger. These are separated by the pit, *i*, and each bears two joint surfaces, upper and anterior, *j*, under and posterior, *k*, the latter in particular are for the shin-bone to revolve upon, and they permit a revolution of two fifths of a circle.

The hip-joint (figs. 2, 3) is an excellent example of a ball-and-socket joint. The *capsular ligament* is shown in section at 3 *a*, but it must be conceived as at 2 *a*, surrounding the entire socket or acetabulum, and binding the pelvis firmly to the neck of the thigh-bone in a capsular form, whence its name. The *round ligament*, *b*, joins the head of the bone to the deep part of the acetabulum, and has for office to keep the hip-joint from being dislocated when the legs are widely extended.

The leg, or lower leg, consists of three bones, the knee-cap or *patella*, the shin-bone or *tibia*, and the splint-bone or *fibula*, of which front and back views are given in figs. 4, 5, and 6. The tibia is so called from its resemblance to an ancient music pipe (*Lat.* *tibia*), the fibula because it is like a brooch-pin. The tibia is prismatic in form; the apex of the prism, called the shin, *a*, is clearly shown, even through the skin. The head, *b*, has two joint surfaces, *c*, *d*, a short process (*e*) between them, cleft by a pit. The surfaces are slightly concave, and they have to receive upon them the joint surfaces of the thigh-bone. The flat joint-surface for the fibula is at *f*, and *g* is the tubercle for the attachment of the ligament of the knee-cap. The lower end or base, *h*, has a joint-surface, *j*, concave from before to behind for the astragalus or knuckle-bone of the foot (*tarsus*), and on the one side it has an irregular surface to receive the fibula, while on the other side it bears the large process of the inner ankle, *k*, the outer ankle being made by the fibula at *b'*.

The knee-cap or patella (fig. 6) is just as much a part of the tibia as the olecranon process (elbow) is of the ulna, but the knee-cap has become entirely separated from its main bone, while still retaining its function of preventing too extensive a swing at the joint. (It still remains a fixed part of the tibia in some water birds.) In man it is of triangular shape, rough on the anterior face, *c*, and bearing two joint surfaces, *a*, *b*, behind, moving on the joint surfaces of the thigh-bone. It serves to lengthen the available leverage surface of the tibia, and also to protect the knee-joint from the front.

The tibia (figs. 4, 5) is a long thin bone placed on the out-side of the shin-bone or tibia, with many sharp longitudinal ridges to give points of attachment for muscles. It serves, with the ligament which connects the two bones all down their length, greatly to broaden the muscular basis of the lower leg, as well as to make part of the ankle.

The knee-joint (figs. 7, 8, 9) has eight articular processes, two each for the condyles of the thigh-bone, for the knee-cap, and the shin-bone. The ligament of the knee-cap, *a* (fig. 7), is so strong that it remains uninjured even when sufficient force is exerted to break the knee-cap itself. The capsular ligament, *b*, *b*, is also attached to the knee-cap, and passes from the neck of the thigh-bone to that of the shin-bone, enveloping the whole joint in a capsule, and strengthened by the internal lateral ligament, *c*, and the external, *d*; the posterior ligament is shown at *e* (fig. 9), spreading over the back of the capsular ligament. These last-named ligaments are outside the capsule. Within it are the crucial (*i.e.* cross-wise) ligaments, *f*, *g* (fig. 8), tying the heads of the bones themselves together. To prevent the joint from slipping when it is bent—as all the ligaments except that of the knee-cap are loose—the semilunar (wedge-shaped) cartilages, *h*, are placed between the bones, thick at the outside and rapidly thinning off towards the interior of the joint.

The knee is a hinge joint, but a slight rotation is permitted as well. The ankle is also a hinge joint, but allows far less lateral motion, and its deep sides, embracing the knuckle-bone or astragalus of the tarsus of the foot, make it a very strong joint indeed, and one very rarely disturbed by any violence.

As regards the muscles of the leg they are specially included in large tendinous sheaths, serving to keep the shape of the limb evenly when the muscles are flaccid and at rest, as well as to strengthen them by giving resistance when they swell in action. The chief are the broad sheath of the thigh (*fascia lata*) and the anterior tibial sheath. The first has a special muscle to tighten it, the *tensor vaginæ femoris* (Plate II., fig. 10 *), which serves also to rotate the thigh inwards. The muscle which bends the thigh upon the trunk, and is therefore the first used in walking, as it raises the leg from the ground, is a two-headed muscle, the *vertebro-iliacus* (*a*, *a*), sometimes regarded as two, and then called *psoas magnus* and *iliacus internus* respectively. It rises from the lowest vertebra of the spine by many attachments, and also from the whole surface of the iliac bone, and ends in the small trochanter of the thigh-bone. If the feet are kept to the ground, then it bends the trunk on the legs. Its great antagonist is the large muscle in the body, the *gluteus maximus* (fig. 11 *b*), a very wide thick muscle, ending in a long attachment extending a third of the entire length of the thigh-bone. It pulls the body back upon the thigh if the feet are fixed on the ground, and is the great muscle for preserving the erect posture of the body, and hence its greater fullness in man than in other animals. It is never at rest except in the recumbent position, for even in sitting it is in action, to prevent the body from falling forwards.

There are six muscles, which all tend to turn the leg a little outwards, and with it the toes, so as to broaden

the base of support upon which the body stands. The *gluteus medius*, one of these, is shown at *c*, the *gluteus minimus* at *d* (fig. 12). The latter aids the *tensor vaginæ femoris* also to twist the thigh inwards. Other abducting muscles of the thigh are the small *pyriformis* (fig. 12 *e*), the *obturator internus* (fig. 13 *f*), the two-headed *gemini* (fig. 12 *g*), the *quadratus femoris* (figs. 12 and 14 *h*), and *obturator externus* (fig. 14 *i*). The adducting muscles, which oppose all these, form the large mass occupying the inside of the thigh, one single and one three-headed muscle. These are the *pectineus* (fig. 10 *j*), and the *triceps adductor femoris* (fig. 14 *k*), a very large muscle, the chief part of the fleshy inside of the thigh. When the feet are fixed these last-named adductors fix the pelvis and prevent it swaying. If one foot rest on the ground they pull the trunk down on to that thigh. If the foot is not fixed they bring the thigh upwards, inwards, and forwards.

There are seven thigh muscles acting on the lower leg, the chief of which is the *quadriceps extensor cruris* (fig. 19 *a b c*, Plate III.), which extends or straightens the leg on the thigh, and at the same time bends the whole leg on the trunk; it is a very important muscle in walking, as it carries the leg up and forwards. It is also the muscle which enables us to rise from the sitting to the erect posture. Its antagonists are four, all of course situated upon the back of the thigh. They bend the leg upon the thigh, and extend the thigh upon the pelvis. They are the *semitendinosus* (fig. 15 *m*), the *semimembranosus* (*n*), the *biceps flexor cruris* (*o*), and the *popliteus* (fig. 16 *p*). The other muscles of the thigh are the *gracilis* (fig. 15 *q*), an assistant of the great adductors, and the *sartorius* or "tailor's muscle" (figs. 10 *r* and 19 *s*), the longest muscle of the body. This last starts from the hip-bone in company with the *tensor vaginæ femoris* (fig. 10 *), soon becomes fleshy, runs downwards, inwards, and forwards to the lower third of the thigh, becomes tendinous, winds round the head of the tibia, and is inserted into that bone below the tubercle. It flexes the leg and thigh upon the pelvis, at the same time drawing the knee upwards so as to cross the opposite thigh, whence its name. It is in fact the cross-legged muscle.

The muscles of the lower leg (Plate III., figs. 16, 17, 18) are ten in number, six operating directly on the foot, and four directly on the toes. The *tibialis anticus* (fig. 17 *s*) lies in the outer hollow of the shin-bone, and serves to bend the foot upon the leg and turn its inner edge upwards; the long and short *extensors* of the toes (*t*, *r*) bend back and upwards the toes upon the foot; the *extensor* of the great toe, covered by the last, does the same specially for that digit. The two *peronei* (*w*, *x*), long and short, raise the outer margin of the foot, aid in extending the foot upon the leg, and at the same time rotate the foot outwards upon the leg. The long peroneal muscle and the *tibialis anticus* both end in powerful tendons, inserted in the arch of the foot close to each other from opposite sides; they serve therefore as a sort of sling, supporting the foot and materially assisting the great muscles of the calf.

The calf of the leg consists of a large three-headed muscle with two large muscular bellies, joining below in the great tendon Achilles. This large muscle is the *gastrocnemius* (figs. 19, 20 *n*, *o*, 7, 8), one mass, itself double in form, lying above the other. This is the muscle which elevates the heel, and antagonizes the muscles which bend the foot upon the leg. The *plantaris* (fig. 16 *z*) has the longest tendon in the body; its use is to twist the inside of the heel upwards, and assist the great muscle of the calf. The *tibialis posticus*, rising from the back of the shin-bone, sends its tendon beneath the ankle, and ends in a number of tendons inserted beneath the foot into the bones of the tarsus; its office being to bend the foot upon the leg by pulling the bones from beneath, and the long

flexor of the toes (fig. 18 a) bends them beneath the foot, hooking them therefore so as to grasp the ground, a most important action in walking, especially to the natural shoeless man. If the toes be fixed, this muscle assists in bringing the body to the tiptoe attitude. This is also powerfully helped by the flexor of the great toe (fig. 18 d), whose tendon crosses beneath the foot in a sharp bend, and forms a second sling with the tendon of the long flexor of the toes to that already described above as formed by the tendons of the tibial and peroneal muscles.

LEGACY (Lat. *legatum*), a bequest or gift of goods and chattels by will or testament. The person to whom it is given is termed the legatee (*legatarius*). The bequest is not complete without the assent of the executor or administrator to the will annexed, as the case may be. [See EXECUTOR.] But, before such assent, the bequest is transmissible to the personal representatives of the legatee, and will pass by his will. The executor or administrator is not bound to admit that there is anything due to the legatee till the debts of the deceased are paid.

Legacies are of two kinds, *general* and *specific*. A legacy is general when it is so given as not to amount to a bequest of a particular thing, or a particular fund of the testator; a specific legacy is a bequest of a specified thing, or a specific part of the testator's estate. There is also a third description of legacy, partaking somewhat of the nature of both kinds already mentioned, as a gift of so much money, with reference to a particular fund for payment. This is called a *demonstrative* legacy, but it so far differs from one properly specific, that if the fund pointed out fails on any account, the legatee will be paid out of the general assets.

Legacies may be given either absolutely (*pure*, as the Roman jurists termed it), or upon condition (*sub conditione*), that is, on the happening of any contingency, provided it must happen, if at all, within the duration of a life or lives in being at the time of the decease of the testator and twenty-one years afterwards, allowing in addition the period of gestation where the contingency depends upon the birth of a child. When a legatee has obtained such an interest in the legacy as to be fully entitled to the property in it, the legacy is said to be *vested*, and this property may be acquired before the right to the possession of the legacy accrues. A vested legacy is transmissible to the personal representatives of the party entitled to it, or passes by a will; a legacy which is contingent, or not vested, is no property at all with respect to the legatee.

Formerly, in all cases when a legatee died before the testator, the legacy lapsed or failed, and went to the person appointed residuary legatee by the testator, or if there was none such, to the next of kin, and lapse might also take place (as in the case of a legacy given to a legatee at a particular time, or upon condition, or the happening of a contingency) if the legatee died before the appointed time arrived, or if the condition was not performed, or the contingency did not happen. The statute 1 Vict. c. 26, s. 33, has modified the old rule.

It may be stated, as a general rule, that legacies are payable twelve months after the death of a testator, and with interest from that time, unless the testator has made some special provision as to the time of payment and interest. When a specific legacy consists of some determinate chattel, whether real, as a lease for years, or personal, as a particular horse, the legatee, after assent by the executor to the legacy, may take possession of it, or sue for it by action at law; but where the specific legacy consists of money, &c., and in all cases of general and of demonstrative legacies, no action at law lies unless the executor has, for some new consideration beneficial to himself, expressly promised payment.

Except when left by a husband to a wife, or *vice versa*, all legacies pay a tax. Children of the deceased, or any

lineal ancestor, pay £1 per cent.; brothers and sisters, £3 per cent.; uncles and aunts, £5 per cent.; strangers in blood, £10 per cent. There are also stamp duties on probates of wills and on letters of administration.

The law of Scotland on this subject does not differ essentially from that of England. In Scotland a verbal legacy for more than £100 Scots (£8 6s. 8d.) is ineffectual. When no time is stated for payment of a legacy it is due at the testator's death, and from that date bears interest at 5 per cent. Payment, however, cannot be enforced till the elapse of six months. If a time be specified other than that of the testator's death the legacy vests from the said death, but is not payable till the date specified, nor does interest run upon it till after that period. When the legacy consists of a special article, delivery, unless otherwise directed, takes place immediately after the testator's death. A legacy lapses by the legatee predeceasing the testator, and the statute 1 Vict. c. 26, s. 33, does not apply to Scotland. If a testator bequeaths something which he believes to be his own, but which really belongs to another, the legacy is ineffectual; but if he knew that it was not his own the article must be purchased or the legatee otherwise satisfied out of the executors. A legacy of that which is erroneously supposed to be movable is of no effect. When a particular debt is bequeathed, if it has been paid during the life of the testator the legacy falls. In addition to *general* and *specific* legacies the law also recognizes *universal* legacies. A universal legacy comprehends all the testator's estate, or the reversion or residue, after satisfying expenses, debts, and other legacies.

LEGAL TENDER. As a debtor might often find it inconvenient a creditor, and possibly evade or partially evade a debt by refusing to pay it except in an inconvenient form to the receiver, as if a man should offer to pay a debt of £10 in halfpence, &c., certain limitations are fixed upon the amount of coin, &c., which may be tendered legally in payment of a debt. Copper (i.e. bronze) coins of the realm are a legal tender up to twelve pence only; silver coins of the realm are a legal tender up to £2 only; sovereigns, unless light, are a legal tender for any amount (see SOVEREIGN); and bank notes are a legal tender for sums of £5 and over if they are bank notes of the Bank of England, the notes not being a legal tender. In Scotland Bank of England notes are not a legal tender (8 & 9 Vict. c. 38, s. 15). If the creditor refuses a debt when offered in the form of a legal tender he does not forfeit his debt, but he forfeits all claim to the expenses of recovering it, and has to pay any costs that may arise.

The words *legal tender* apply to the payment of a debt purely. A shopkeeper selling an article over the counter may refuse coin in a certain shape if he pleases, even if it be in the form of a legal tender; but he could not (except with the penalty named) refuse the same amount tendered in the same form of a debt already on his books.

LEGATE, a person chosen or commissioned (Lat. *lego, legatus*) to do certain things. The word has two great uses, that of ancient Rome and that of the Roman Catholic Church.

The *legate of ancient Rome* was either an ambassador from the Senate to a foreign power, or a distinguished officer on the staff of a general in the field, a consul, or dictator, chosen by the general and approved by the Senate. Such *legati* could replace the general in his absence. The staff of legates varied from three to fifteen, according to the size of the army. In imperial times the word became equivalent to viceroy, a large part of the provincial administration being in the hands of legates appointed by the emperor.

The *papal legate* is an officer representing the papal authority in much the same way. The most dignified is the *legate a latere*, such as Wolsey was, the legate sent

"from the side" of the Pope, nearly always a cardinal, and exercising supreme papal authority in the land to which he is sent. Wolsey, for instance, though archbishop of York, overrode the authority of Canterbury by his legatine powers, and was for the time the chief ecclesiastic in England. Many disputes arose in mediæval times over the reception of legates; in England they culminated in the famous statute of *præmunire* (1393). Wolsey suffered under this statute. Legates of a lower rank than cardinals are called *nuncii apostolici* (apostolic messengers).

LEGATEE. See LEGACY.

LEGATO (Ital., tied), in music, a term used in opposition to *staccato*, implying that one note is tied to another, and represented by placing these marks \frown above or below the notes intended to be so joined. Where these *legati* appear, the notes are to be played in a smooth and gliding manner, each note on the piano to be held down till the next is struck. When the legato mark joins two notes identical in position, as C to C, F₂ to F₂, &c., it is called a *tie*, and the second note is not struck afresh, but held down as a prolongation of the first note. The ordinary legato mark, covering two or more notes of various names, is often called a *slur*. It would seem highly desirable to distinguish between a slur and a tie. Sir William Sterndale Bennett at one time sought to use \frown for the *tie* and \smile for the *slur*, but his practice has not been generally followed.

LEGEND (Lat. *legenda*, to be read) a name originally given to the book containing the portions of Scripture selected by the church and appointed to be read as daily lessons. Later it was used to include also other religious writings used in divine service, and the books of instruction designed for the use of religious houses, which were read by the monks at matins and during meal times in the refectories. From a very early period in the history of the church, collections of narratives were made relating to saints and martyrs, and as the number of these increased a place was found for them in the services of the church, and the stories became known as legends. In the preparation of such works as the lives of the saints and the histories of the martyrs, the material available was often very scanty, but at the same time the nature of the subject afforded fine scope for a pious imagination. Then there were abundance of wonderful stories in circulation respecting the heroes and deities of paganism, as well as wonderful narratives which had found their way from the East to Europe, and it was very easy for a devout monk, anxious to advance the fame of a patron saint, to father upon him some of the marvellous acts recorded of some Oriental and heathen hero, or to invent some action of equal greatness. Certainly many stories were formed in this way, and the authentic history of the saints and martyrs was overlaid with a fictitious embellishment which, when the necessity for historical veracity became apparent, caused these stories to fall into disrepute. Hence the modern use of the terms legend and legendary, to signify stories that are untrustworthy and derived partly from the imagination.

The ecclesiastical literature of the middle ages is peculiarly rich in the legendary element, and extensive collections of the stories indicated may be gathered from the poetical and prose works of that period. Many of these legends unquestionably enshrine historical and biographical facts, and also many stories of great beauty and value when regarded as allegories. They also serve to illustrate the way in which the primitive beliefs and customs of the people became altered and transformed under the influence of Christianity, and in the records of the early saints and missionaries we distinguish the transference of the attributes of the old gods to the apostles and saints of the Christian religion. One of the most striking of the Christian legends, in which the founder of Buddhism has obtained honour as a Christian saint, is elsewhere

noticed. [See BARLAAM AND JOSAPHAT.] After the Reformation, when the controversy between Protestant and Roman Catholic theologians was in full vigour, the legends of the mediæval period became a favourite subject for the attack of Protestant writers, and these stories were presented in a light which can hardly be justified. Many of them are undoubtedly corrupt and of an objectionable character, but there are others which are pure and valuable, and represent the literary method used in all simplicity by pious men to convey their teaching. In the present day, when the heat of the controversy has somewhat abated, or at all events has changed its direction, these stories are studied by historians and investigators into folk-lore, &c., with considerable advantage to the advancement of knowledge. Further, it may be noticed that the mental condition favourable to the rise and growth of legends has by no means passed away, nor have we far to go to see evidences of its working. Perhaps one of the most remarkable illustrations of the way in which an actual living man may be invested with a legendary halo is to be found in the conception of Garibaldi which prevailed among the Italian peasantry during his lifetime, and which has probably lost nothing since his death. Thus it is said that they believed him to be invulnerable; that his red shirt was dyed in the blood of the enemies of Italy; that when his army was perishing from thirst he brought water from a rock by firing a cannon ball at it; and the storm which swept over the neighbourhood about the time of his funeral was looked upon as a sign of his anger at the failure of his executors to fulfil his injunctions for the cremation of his body.

The legends of the Oriental nations are now the subjects of careful study on the part of a band of enthusiastic scholars, and a vast mass has already been made available to the student. Most travellers also now make a point of collecting the legends which prevail among the peoples whom they visit, and much interesting matter has come to light in this way.

Among the principal collections of Christian legends are the "Legenda Aurea" (GOLDEN LEGEND), the "Gesta Romanorum," the "Acta Sanctorum" [see BOLLANDISTS], the "Flos Sanctorum" of Ribadineira (two vols., Madr., 1599-1610), and Baring-Gould's "Lives of the Saints" (fifteen vols., 1872-77). See also FOLK-LORE AND MYTH.

The word legend is also used technically to denote the words encircling a coin. To writing on tablets the word *inscription* is applied, which is also used instead of legend where a sentence, instead of encircling, occupies the place of a device on the coin.

LEGENBRE, ADRIEN MARIE, an illustrious French mathematician, whose name must be ranked with those of Lagrange and Laplace, was born at Paris (or according to some accounts, at Toulouse), 18th September, 1752. Through the influence of D'Alembert he early obtained the chair of mathematics in the military school at Paris, and in 1783 became a member of the Academy. In 1787 he was appointed one of the commissioners for connecting the observatories of Greenwich and Paris geodetically, his colleagues being Méchain and Cassini, and General Ray being appointed to conduct the operations on the English side. During the Revolution he served on the public commissions appointed to determine the length of the metre, to form the French tables of logarithms, &c., and afterwards he held important positions as director of the university and examiner in l'École Polytechnique. He died at Paris, 10th January, 1833. His chief works are the "Exercices de Calcul Intégral" (three vols., 1811-16), "Traité des Fonctions Elliptiques" (two vols., 1827), "La Théorie des Nombres" (two vols., 1830), and "Éléments de Géométrie" (1794). He was also the author of a large number of separate papers of great value upon various questions in pure and applied mathematics.

LEGER-LINES, in music, those lines which are added above or beneath the five lines composing the stave. They provide for such notes as are too high or too low to be placed upon or within the regular stave, and are to be regarded as a temporary widening of the stave to six, seven, eight, or more lines, all the rules of the stave being duly observed. These lines were drawn lightly in older times, hence their name *leger* (light). But some etymologists prefer to derive the name as in the case of **LEDGER**.

LEGGIE'RO (Ital., lightly), a term in music, directing a light, rapid, easy style of performance, aiming at delicacy, not force.

LEG'HORN (*Liborno*), a large maritime city and seaport of the kingdom of Italy, is situated at the southern extremity of a low and partly marshy plain extending from the left bank of the Arno to the hills of Montenero, which end abruptly on the sea about 3 miles to the south. The city is 14 miles S. by W. from Pisa, 45 W. by S. from Florence, with both of which it is connected by railway; it has 99,000 inhabitants, of whom many are Jews. The town is neatly and regularly built; the streets are wide and mostly straight, and there is a fine square in the centre. The western district, called *La Nova Venezia*, is intersected with canals, by which the goods are carried in boats from the shipping in the harbour and landed before the warehouses of the merchants. Many of the private houses are handsome. The shops are well supplied with goods, and fitted up in good taste. The English and Lutherans have chapels and burying-grounds, the Greeks a church, and the Jews a very handsome synagogue. The old English burying-ground, now closed, situated on the ramparts, is adorned with numerous marble monuments—among others is that of Smollett, who died here. The town itself is little more than 2 miles in circumference; but two large suburbs, one beyond the north or Pisa gate, and the other to the south, called *Borgo Cappuccini*, have gradually increased to the size of towns, and have been included within the boundaries of the *Porto Franco*, where goods could formerly be landed and warehoused, and exported again free of paying duty. The outer mole, which is more than a mile in length, and joins the lighthouse, affords a pleasant walk. To secure increased shipping accommodation, a harbour has been constructed for vessels of considerable tonnage, but the very largest still lie in the roads, where the anchorage is safe and good, and still further works are in course of construction to increase the convenience of the port; some of the largest building slips are capable of being used for the construction of first-class ironclads. The *Darsena*, or interior harbour or dock, is only fit for smaller vessels. Near the *Darsena* stands a fine colossal statue of Duke Ferdinand I., a great benefactor of Leghorn. The lazarettos, of which there are three, outside of the town and on the seashore, are remarkable for their excellent distribution and perfect security, being surrounded by wet ditches, and furnished with extensive warehouses and convenient lodgings.

Leghorn is rather a commercial than a manufacturing town; it has, however, tan-yards, rope-walks, soap and candle factories, glass-works, establishments for the manufacture of coral ornaments, woollen caps, cream of tartar, borax, and sulphur. Steamers and sailing vessels are built. The chief public edifices are the former ducal palace, the arsenal, the *duomo* or cathedral (a Gothic building designed by Vasari), the town-hall, the great oil warehouses erected in 1705, and the Jewish synagogue. It has also a casino or assembly-house, a theatre, a public library, and very good inns and coffee-houses. Educational establishments of all kinds are numerous.

Leghorn embraces all the foreign trade of Tuscany, and ranks as the greatest commercial emporium in Italy, next to Genoa and Naples. The imports are either for consumption or for transit. They consist of corn, cotton, hemp, wool, sugar, raw and manufactured silk, bronze work and

jewelry, cotton and cotton yarn, spices and drugs, dye-stuffs, porcelain, gun, wine, spirits, tobacco, &c. Many of these articles of course enter into the exports, for the transit trade is very extensive. Other exported articles are oil, anchovies, paper and rags, straw hats, marble and alabaster, works of art, timber, cork, coral, tallow, potash, &c. Steamers ply regularly to Civita Vecchia, Naples, Sicily, Genoa, Nice, and Marseilles.

Leghorn is supposed to be the ancient *Portus Herculis* or *Labronia*, but it has no remains of antiquity. In the fifteenth century it was a mere village surrounded by swamps, and it owes much of its eminence and prosperity to the Medici family, and the liberality of the former rulers of Tuscany. It was made a free port by the Grand-duke Cosmo in the sixteenth century. Some of its privileges were abolished in 1868, a measure which had the effect of diverting part of its trade to other ports, but as a port of transit to and from the interior its operations are still very extensive. Large numbers of visitors resort to Leghorn during the summer season for its baths and mineral springs, the latter of which enjoy high medical repute.

LEGION. In a Roman consular army each grand division, corresponding nearly to a modern brigade, was so denominated; and the word indicates a selection of the individuals composing such division (Lat. *legere*, to choose). The name is still occasionally given to a body of troops consisting of several regiments or battalions, when raised at a particular place or for a particular service.

The strength of a Roman legion varied at different periods. Romulus divided the men who were able to bear arms into legions of 3000 men, but towards the close of the republic the number amounted to more than 6000. The legion declined under the later emperors, and in the time of Constantine did not number more than 1500 men.

The manner in which the soldiers were elected to serve in the legions is fully described by Polybius (book vi. ch. 1). When an army consisting of four legions was to be raised, the citizens of the proper ages being assembled on an appointed day in the capital, the military tribunes drew out the tribes by lot, and from that which was first called they selected four men of nearly equal age and stature. Of these the tribunes who were appointed to the first legion chose one; those who were appointed to the second legion chose another; and so on. Afterwards the whole body of the tribunes chose four other men, and of these the tribunes of the second legion first chose one; those of the third legion then chose another; and so on, the tribunes of the first legion taking the last man of the four. In like order the election proceeded till the required number of men was obtained.

Immediately after the enrolment, the recruits for the legions being made to advance one by one, each was sworn to be obedient to his commanders, and to execute all their orders to the utmost of his power.

On the institution of regular bodies of troops by Romulus, he is said to have divided them (probably each legion) into companies of 100 men, and these were called *Manipuli*, from the bundles of grass which served as standards for the people who accompanied him when he attacked the palace of Amulius. The first mention of a cohort occurs shortly after the expulsion of the kings (Liv. ii. 11); and in the time of Polybius the legion, then numbering 6000 infantry (exclusive of the cavalry attached to it), was divided into ten cohorts, each of these into three manipuli (Polybius, b. xi.), and each of the latter into two centuries.

Servius Tullius is said to have divided the military force into five different classes of troops (Liv. i. 43), which were distinguished by their armour; but from the commencement of the republic, or nearly so, the order of battle consisted of three lines of troops, the *Hastati*, the *Principes*, and the *Triarii* (Liv. viii. 8). The *Velites* (light troops or skirmishers) had no particular station.

All the three classes were completely armed with cuirass, helmet, and greaves. Their buckler was 4 feet long and 2½ feet broad, and five arrows were placed in its concavity, to be thrown when necessary. Each man was provided with a long and a short sword, the blade of the former being strong, and made either to cut or thrust; and he carried, besides, two javelins, or *pila* (Polybius, b. vi.)

The front of the legion, when in order of battle, was formed by ten corps of the hastati, each corps being arranged with sixteen men in front and ten in depth. The second line, or that of the principes, was of the same strength, and was drawn up in the same manner. The line of triarii consisted also of ten corps, but these had only ten men in front and six in depth. Every legionary soldier was allowed 5 feet in front and as much in depth, in order that he might be enabled to make free use of his arms.

The cavalry of a Roman legion was divided into ten *turme*, of about thirty horses each, who, in order of battle, were drawn up with eight in front and four in depth. Each legion of the allies had, however, 600 horsemen; so that the cavalry of a consular army (consisting of two Roman legions and two legions of allies) amounted to 1800 men, who were disposed on the wings of the legion, in one line or two, according to circumstances.

LEGION OF HONOUR, ORDER OF THE.

This order of merit was founded in France under the consulate, by a law of 19th May, 1802, to take the place of the ancient military or religious orders which had been swept away by the Revolution. As at first constituted, with the First Consul for its *ex officio* grand master, it consisted of a grand council of seven members, presided over by a grand chancellor, and of sixteen territorial chapters, each of which was composed of seven grand officers, twenty commandants, thirty officers, and 350 legionaries. The number of members was subsequently increased, and the title chevalier substituted for legionary, and between 1805 and 1814 about 18,000 nominations were made, nearly the whole of which were for service in the army. In the year 1815, on the second restoration of the Bourbons, the entire number of the different divisions of this order was over 30,000. Under Louis XVIII. the old military and religious orders were replaced, and the Legion of Honour was reduced to the last place. The king took the place of grand master, the title of commandant was changed to commander, the grand cordon to grand cross, and the membership was divided into five grades—eighty grand crosses, 160 grand officers, 400 commanders, 2000 officers, and an indeterminate number of chevaliers. Louis Philippe distributed the decorations with a profuse hand, and in 1815 there were no less than 49,417 members. This immense number had naturally detracted much from the value which was at first placed upon the honour, and under Napoleon III. the legion was reconstituted upon a fresh basis. By a law of 22nd January, 1852, the grand crosses were limited to eighty, grand officers to 160, commanders to 400, and officers to 2000, exclusive of the imperial family and of foreigners. The number of chevaliers was left open, but it was diminished by the creation of but one fresh chevalier for every two deceased. Candidates in time of peace were chosen from those who had served the state in some military or civil capacity for twenty years; exceptional exploits or severe wounds constituted a claim in time of war. The distribution was made twice a year, the admission being made upon parade in the case of military men, civilians being decorated at a public sitting of a court of justice. Under the second empire the honour was conferred on many men eminent in science and literature, and was not confined exclusively to Frenchmen. It was awarded to many British subjects, who distinguished themselves in the Crimean War, and in the great international exhibitions

held at Paris. Since 1870 the maximum number of chevaliers has been fixed at 25,000, the remaining four classes having 70, 200, 1000, and 4000 respectively, but it is now open to civilians, though they must never constitute more than two-fifths of any grade. The yearly pension of a military chevalier is 250 francs; of an officer, 500; of a commander, 1000; of a grand officer, 2000; and of a grand cross, 3000. In addition to these pensions there are institutions for the education and maintenance of the children, sisters, and nieces of members of the order, and pensions are also paid to necessitous and disabled members out of the funds belonging to the legion in addition to the government payment. The College of the Legion is possessed of considerable wealth, which is partly derived from a portion of the property of Louis Philippe. Under the first empire the decoration consisted of a white enamelled five-rayed star, bearing the portrait of Napoleon, and a wreath of oak and laurel, with the words "Napoleon, Empereur des Français;" on the reverse was the French eagle grasping a thunderbolt, and the legend "Honour et Patrie." The ribbon was of watered scarlet silk. At the Restoration the effigy of Henry IV. was substituted for that of Napoleon, and the fleurs-de-lis replaced the eagle, to make way in their turn for the tricolour in 1830. By Napoleon III. a modified form of the original decoration was introduced, and it took the form of a cross of ten points of white enamelled with gold, the points connected with a wreath of laurel proper, and in the centre, within an azure circle charged with the words "Napoleon III., Empereur des Français," was a head of the emperor. It was ensigned by the imperial crown of France, and worn attached to a red ribbon. After the downfall of the second empire the decoration was again changed, and it now bears the effigy of the republic and the words "République Française" on the obverse side, and on the reverse two tricolour flags with the original legend.

LEGION, THE THUNDERING. In 178 A.D. the most noble and virtuous of all the Roman emperors, Marcus Aurelius, gained a complete victory over the Quadi, one of those barbarian tribes who kept the Roman Empire in perpetual distress upon its northern frontier. Returning from the campaign through fierce summer heat a Roman legion suffered the tortures of thirst, and sickness prevailed to an alarming extent. Suddenly, after days of drought, rain fell copiously from a cloudless sky; and as the soldiers lay drinking at the little pools, the Quadi, who had followed them secretly, fell upon their disordered ranks, and a great slaughter began. All in a moment the sky darkened, it thundered violently, lightning flashed; the terrified Quadi drew off a little, and were then overwhelmed by a storm of fire and hail, while the Roman legion was untouched. This miraculous preservation gained the soldiers the nickname of the Thundering Legion, and the occurrence is commemorated upon the Antonine Column at Rome. Dio Cassius tells the story. Afterwards the Christians alleged that the miracle was the result of certain Christian legionaries who drew down both rain and storm by prayer. The claim was very hotly pressed in early times, but there is no contemporary evidence. There seems no legitimate reason for regarding the event as in any way beyond the scope of nature. It is unusual, but not unnatural.

LEGISLATION. A magistrate who proposed a law in Rome was said *legem ferre* (as we say, to bring a bill into Parliament); and the law, if carried, was said to be *perlata*, or simply *lata*. Hence the term *legem lator*, or *legislator*, was used like the Greek *nomothetês*, in the sense of a lawgiver. From *legislator* have been formed *legislation*, *legislature*, *legislature*.

Legislation means the making of positive law. A general command, or law, would be nugatory if it were not applied in practice to the cases falling within its scope, and

if the pains denounced for the violation of it were not inflicted on transgressors. The execution of the general commands, or laws, of a sovereign government is therefore an essential part of the business of a government. Accordingly, the ordinary functions of a government may be divided into the two classes of *legislative* and *executive*.

An *executive* command, or act, of a sovereign government is a special command issued, or act done, in the execution of a law previously established by the government. Executive commands or acts are of two sorts, viz., *administrative* and *judicial*. The distinction between these two sorts of executive commands or acts may (in conformity with modern phraseology) be stated as follows:—A judicial proceeding is a declaration, by a competent authority, that a person has (or has not) brought himself within the terms of a certain penal provision, or that he has (or has not) a certain legal right or obligation which another disputes with him. An administrative proceeding is for the sake of carrying a rule of law into effect, where there is no question about the legal culpability, or dispute about a legal right or obligation of a person. In an administrative proceeding the government functionary acts, or may act, spontaneously and from his own information; in a judicial proceeding he does not act until he is set in motion by others, and he can only take notice of the facts which the litigant parties bring before him.

LEGITIM, or BAIENS' PART OF GEAR, in Scotch law, is the legal share of the father's free movable estate falling to the children of the marriage at their father's death. When a father dies, leaving a widow and children, a division of his movable estate is made, one-third going to the widow as her *jus relictæ*, another to the children in name of *legitim*; while the remaining third, or *dead's part*, if not disposed of by the father during his lifetime, goes also to the children as his next of kin. If the deceased has left heritable estate, his eldest son, as his heir-at-law, is excluded from a share of the legitim, unless he chooses to collate the heritage with the younger children. By the Married Woman's Property (Scotland) Act, 44 & 45 Vict. c. 21, children may claim legitim out of their mother's estate.

LEGITIMACY. All children are legitimate who have been procreated in lawful wedlock, or, in Scotch law, have been legitimated by the subsequent marriage of their parents. [See LEGITIMATION.] The presumption of legitimacy arising in favour of a child born of a mother who at the time of conception was lawfully married, can now be rebutted only by the clearest evidence that the husband could not possibly be the father of the child.

LEGITIMATION, the act by which children born in bastardy are made lawful children, may take place, according to Scotch law, in two ways, either by the subsequent marriage of their parents, or by royal letters of legitimation.

1. *Legitimation per subsequens matrimonium*, a remedy borrowed from the law of Rome, is competent only when the parents at the time of the birth, and also at the time of the marriage, were domiciled in Scotland, and were under no legal impediment to marry at the time of the procreation of the child. The fact of the parties having contracted an intermediate marriage between the date of the birth of the child and their subsequent marriage, does not operate any bar to legitimation. Yet the rights of children born of the intermediate marriage cannot be prejudiced by those of the children subsequently legitimated. But a child legitimated in this way cannot succeed to real estates in England, for in that country legitimation by subsequent marriage is unknown.

2. *Legitimation by royal letters* operates only to the effect of dispensing with the crown's right of succession to the intestate estate of the father of the bastard. See **BASTARD**.

LEGITIMISTS, a political party of modern France. When the Bourbons, in the person of Charles X., were

expelled finally from the throne of France in 1830, the younger Bourbon branch, that of Orleans, came to power in the person of Louis Philippe. Charles X. had two sons, the Duc d'Angoulême and the Duc de Berri. The latter was murdered on 14th February, 1820, but the duchess was said to be *enceinte*, and a son was born to her on 29th September of the same year, who was created Duc de Bordeaux, and regarded as a heaven-sent child (*l'enfant du miracle*). In their joy the people subscribed to purchase the Castle of Chambord, which they presented to the royal baby. In the troubles of 1830 King Charles X. abdicated, hoping by this personal sacrifice to save the crown for his family, and the dauphin, his son the Duc d'Angoulême, did so too. The little boy, grandson of the one and nephew of the other, was proclaimed as "Henry V." It was all too late, and the whole family, "Henry V." included, had hurriedly to seek the shelter of England. The young Comte de Chambord, as he loved to style himself, was, in the eyes of Conservatives, legitimately the king of France. Thus arose the party of the Legitimists, who made loyal pilgrimages to England, and afterwards to Venice, to Fribourg, &c., but who could never induce their prince to put himself at their head for a bold stroke. Twice did the Comte de Chambord and the Legitimists have a fair chance of power. The first time was in 1818, when Louis Philippe had been driven from France, and when the errors of the young republic were so many as to make most men ready to welcome anything as a relief from such disorder. But the opportunity was lost by the Legitimists and seized by the band of conspirators who placed the second Napoleonic dynasty upon the throne of France. Again the Legitimists had a real chance of sovereignty; this was at the downfall of the pinchbeck "second empire;" and having gone so far as to issue proclamations in 1870, though it is true they were little heeded, the Comte de Chambord actually entered France in 1871 and styled himself for the first time "Henry V." He was saluted by a considerable party, and negotiations were entered into. They broke down on the absurd question of the flag. "Henry V." would have the old white flag and lilies; the country refused to tear up the tricolour. It was a fancy of the good-natured man that no blood was to flow in his behalf, and as it became clear that without firmness his arrival at the throne was impossible, it is most likely that his obstinacy about the flag was exaggerated to cover his retreat from a position too trying for his feeble character. He died at Fribourg, near Vienna, 24th August, 1883, having received homage as head of their house from the remnants of the dethroned Orleans branch some time previously (1873). The Comte de Chambord was childless, and it was hoped that he might recognize these former rebels as his political heirs upon their repentance. But his will when opened contained no reference to this or any other political matter. He had Spanish and Italian princes nearer relatives than the Orleans princes, and some of the former were invited by the countess to attend the funeral as chief mourners. Upon this the Orleans princes showed great offence, and did not themselves attend. The Comte de Paris, head of the house of Orleans, had taken on himself to represent the elder Bourbon branch, and had sent round a circular letter to all the courts of Europe advising the sovereigns of the death of his august relative; but, contrary to the wishes of his most eager partisans, he signed those letters *Philippe, Comte de Paris*, and not *Philippe II.*, thereby indicating that although he claimed the headship of the Bourbon family he did not, at all events for the time, pose as a pretender to the crown of France. The matter closed by an explanation from the aged Comtesse de Chambord, that what she had done was not intended to throw doubt upon the "undoubted hereditary rights" of the Orleans family.

Since 1883, therefore, the Comte de Paris, grandson of Louis Philippe, has been the head of the Bourbon family, and the Legitimists and Orleanists have been fused into one party; but by the quiescence of the Comte de Paris the united parties remained in abeyance and dwindled away year by year, to the strengthening of the republic.

LEG'UMIN, or Vegetable Casein, is obtained from pease, beans, and other plants of the natural order Leguminosæ. It is closely allied to animal casein, and contains—carbon, 50; hydrogen, 7; nitrogen, 16; sulphur, 0.5; phosphorus, 1.5. It is insoluble in boiling water, acetic acid, alcohol, and ether. It is soluble in cold water, and the solution coagulates on boiling. It is very soluble in potash, soda, and ammonia. The solution in potash evolves ammonia when heated. Legumin in solution is precipitated by salts of lime, hence hard waters containing gypsum are not suitable for making pea-soup. The solution is also coagulated by rennet, the action being similar to that on casein from milk. A kind of vegetable cheese is made in this way from pease and beans, and used as an article of food in China. These vegetables contain a large amount of nitrogen in the form of legumin, which renders them extremely nutritive and flesh-forming, but somewhat indigestible.

LEGUMINO'SÆ, a very extensive order of plants inhabiting the coldest and hottest, the driest and dampest,



Acacia.

parts of the world; assuming the greatest varieties of form and size, some being among the smallest of flowering plants, others forming the largest trees in tropical forests. They vary also in an extraordinary degree in their sensible qualities, some being eatable, as pease, beans, and other pulses; others poisonous, as *Piscidia*, *Tephrosia*, and *Cytisus*; some secreting a fragrant volatile oil, others destitute of all trace of such a substance.

The species amount to some thousands, and are con-

veniently divided into three sub-orders—*Papilionaceæ*, *Casalpiniæ*, and *Mimoseæ*.

Papilionaceæ have what are called papilionaceous flowers, resembling a butterfly. Of the five petals, one is large and spread open, it is called the "standard;" the two on each side of this are called the "wings," and the other two are united by one edge, forming the "keel." It is here that the great mass of the order occurs, more especially in the colder parts of the world. Pease, beans, clover, sainfoin, lucerne, liquorice, indigo, medicks, trefoils, lupines, and numerous other common European genera, belong to *Papilionaceæ*.

Casalpiniæ have the petals of nearly equal sizes, and the stamens distinct and unequal. They include the Cassia, which furnishes the senna-leaves of the shops, and also the Tamarind and Algaroba fruits, the trees yielding logwood, Brazil-wood, sapan-wood, &c., and Hyguenæa, from which gum-anini is procured.

Mimoseæ have small regular flowers, collected into heads or spikes (see fig.) They comprehend the species yielding the gums Arabic, Senegal, Sassa, and others. *Catechu* is the extract of the astringent bark of *Acacia Catechu*, and rosewood is the timber of a species inhabiting the interior of Brazil. One of the most striking phenomena among the plants of this order is the excessive irritability observable in the leaves of certain species of Mimosa, such as *Mimosa pudica*, &c., which are hence called Sensitive Plants. It is, however, a special peculiarity, and not one of general occurrence, unless the folding up at night of the leaves of the whole suborder be regarded as an instance of the same irritable quality in a low degree.

LEIBNITZ or **LEIBNIZ**, **GOTTFRIED WILHELM**, jurist, historian, mathematician, and metaphysician, the most learned of modern philosophers, was born 21st June (O S.), 1646, at Leipzig, where his father was professor of moral philosophy. The first twenty years of his life were spent almost entirely in Leipzig, where he attended the celebrated Nicolai school and afterwards the university, which he entered in 1661. From a child he was distinguished by an extraordinary precocity, and before he was twelve he could read Latin easily, and had begun Greek, while he had also gathered a vast store of miscellaneous learning from the books of his father's library. After entering college, his first two years were devoted to philosophy under Scherzer and Jacob Thomasino, and at this time he became acquainted with the works of Descartes, of Kepler, and of Galileo, which exercised a great influence over his mind. Having taken his degree in arts, he devoted himself to the study of law, and at the age of twenty he applied for the degree of doctor of law, with the intention of seeking the post of assessor; but owing to some older students also being candidates for the same office, the degree was denied to Leibnitz at this time on account of his youth. He thereupon quitted his native town for ever. From Leipzig he went to Altdorf, where he at once obtained his degree, his thesis being so brilliant that it procured for him the offer of a professor's chair. This, however, he declined, and turned his steps to Nuremberg, where he studied alchemy for a time; and in 1667 he met the distinguished statesman and scholar, the Baron von Boineburg, who had been long prime minister to the Elector of Mainz, and who was then living at Frankfurt-on-the-Main. Boineburg in a great measure determined the subsequent life of Leibnitz, for in the same year the young philosopher accepted his invitation to transfer his residence to Frankfurt, where he became his secretary, and enjoyed the society of men of letters and affairs. He also gained the patronage of the Elector of Mainz, by whom he was employed in legal and diplomatic labours, some of which were of high importance. In 1672 he was sent to Paris to divert Louis XIV. from a suspected attack on Germany by the project of a conquest of Egypt, and he

spent the greater part of the four following years in Paris in the capacity of counsellor to the Elector of Mainz. He found the society there so congenial that he more than once formed the plan of making the French capital his permanent residence. In January, 1673, he visited London as an attaché on a political mission from the Elector of Mainz, and during his short stay there he made the acquaintance of some of the leading English philosophers. Their influence seems to have given him an impulse towards the renewed study of mathematics, and they acknowledged his genius by making him a fellow of the Royal Society. To this period of his life belongs his immortal discovery of the differential calculus, which alone would be sufficient to place him in the foremost rank of mathematicians. It was followed by the famous controversy as to an alleged priority of discovery by Sir Isaac Newton. [See FLUXIONS.] Shortly after his return to Paris in 1673, Leibnitz ceased to serve the Elector of Mainz, and accepted employment from Duke John Frederick of Brunswick-Lüneburg, at whose request he removed in 1676 to Hanover, visiting London and Amsterdam on the way. At the latter place he had an interview with Spinoza. Thus commenced his connection with the court of Hanover, which lasted during the remaining forty years of his life. Henceforward Hanover was his home, and he held a succession of important political and literary offices under Duke John Frederick and his successors, the electors Ernest Augustus and George Louis of Hanover, the latter of whom became George I. of England two years before the death of Leibnitz. The variety of his aims during these forty years is marvellous, and amid them all the development of his speculative genius continued to advance. In public affairs he supported with his pen the political interests of the Brunswick family, laboured with immense zeal, and at first with some apparent prospect of success, at a project of union between the Roman Catholic and Protestant churches (a project long before started between him and Von Boineburg, who was a Protestant convert to Catholicism), engaged in a plan to secure a closer union between the courts of Hanover and Brandenburg, and succeeded in founding the Berlin Academy of Sciences. He was unsuccessful in his endeavours to establish a similar institute at Vienna, owing to the opposition of the Jesuits; but at a personal conference with Peter the Great, czar of Russia, he submitted a plan for an academy at St. Petersburg, which was carried out after the czar's death. During the latter years of his life he engaged again in a project of ecclesiastical union, this time for a general union of Protestants against Roman Catholicism, and especially of the two great sections of Protestantism, the Lutheran and the reformed churches. These negotiations, in which Jablinski, Molanus, and others took part, gradually proved abortive, and in a few years Leibnitz abandoned his effort. It was in literature and philosophy, however, that his highest powers were developed, and his scholarship, as regards the vastness of its range, represents probably the highest point ever yet reached by a single man. History, philology, mathematics, geology, chemistry, medicine, metaphysics, and theology in turn secured his attention, and his busy spirit collected the varied learning of each department. In history he worked for years on the antiquities of the house of Brunswick and the early annals of Germany. Experience of the difficulties of archaeological research suggested to him the study of comparative philology as a means for aiding his efforts to travel back into the past. To this study he accordingly applied himself with extraordinary zeal, maintaining an immense correspondence, and placing ambassadors and Jesuit missionaries under contribution for philological facts. He also carried out a series of interesting speculations concerning the early history of the globe, and in his posthumous treatise, entitled "Protegea," are to be found

curious anticipations of modern geological hypothesis and a remarkable familiarity with geological facts. To the Academy of Sciences he contributed papers on a vast variety of subjects, and by his extensive correspondence with the scientific men and prominent authors of other nations he may be said to have founded the European commonwealth of letters, and to have restored in part that community of intelligence in Christendom of which the universities had been the organ until the Reformation.

Leibnitz was able in an unusual degree to unite the practical and the purely speculative life. But amid his varied political and ecclesiastical projects, and his marvellous literary activity, the metaphysical tendency always retained its ascendancy in his mind. His philosophical principles were gradually matured after his settlement in Hanover in 1676, and were given to the world from time to time in a fragmentary form, through reviews, letters, and occasional tracts. Of these the most important are his "Meditationes de Cognitione, Veritate, et Ideis," which appeared in 1684 in the *Acta Eruditorum* of Leipzig; his "Système Nouveau de la Nature," published in the *Journal des Savans* for June, 1695; "La Monadologie," written in 1714 for Prince Eugène of Savoy; the "Theodicea," published in 1710, and the best known of his works; and a reply to Locke, called the "Nouveaux Essais," written in 1703-4, but not published until 1765. In 1714 there appeared his "Principes de la Nature et de la Grâce," and the following year he entered into a controversial correspondence with the English metaphysician, Dr. Samuel Clarke. The replies of Leibnitz and the rejoinders of Clarke constitute a work containing as large an amount of curious metaphysical discussion as any production of modern times. While still engaged in the controversy, Leibnitz died, 11th November, 1716. Eckhart has recorded some particulars regarding the personal appearance and manner of life of this philosopher. He was of middle stature, rather spare in person, and short-sighted. He was of vigorous constitution, and pursued his studies with such zeal that often for days together he did not leave his chair. In his journeys he was accustomed to carry on mathematical and philosophical investigations in his carriage. He was never married, had no domestic establishment, and took his meals without any regularity, at whatever times were least inconvenient for his studies. Temperate in his habits, and tolerant in judgment, he was nevertheless of a quick temper, and was impatient of contradiction in small matters. He is said to have been fond of money to the point of covetousness, and to have had a strong desire for fame and honour. The latter element in his character caused him to feel keenly the neglect and indifference of countrymen and of his royal master during the closing years of his life. No complete edition of his works has ever been published, but the greater portion of them are to be found in the editions of Dutens (six vols. 4to, Geneva, 1768). His philosophical works were published three years earlier by Kasse, and republished with many additions in 1810 by Erdmann. Separate portions of his works have been several times reprinted in Germany and France.

Philosophy of Leibnitz.—The metaphysical philosophy of Leibnitz may be regarded as a reconstruction of Cartesianism on a broader basis, and with important modifications, suggested by the consequences into which the Cartesian system had been resolved by Malebranche and Spinoza. The systems of Locke and Leibnitz are in truth reactions, in opposite directions, against the earlier philosophy as involving these consequences. Cartesianism, which places the essence of matter in extension, and of mind in thought, tends to eliminate altogether finite causes and substances. Malebranche accordingly rejected secondary causes, and virtually resolved all the changes in the universe into the agency of God. Spinoza, advancing

further, deduced all finite existence from the One Absolute Substance. The metaphysic of Leibnitz is fundamentally a theory of the essential activity of the substances or monads of existence, which possess, according to him, a power of spontaneous development. In these unextended forces or monads we obtain, says Leibnitz, the *a priori* idea of substance. Their individuality consists in the series of changes through which each passes. These changes are termed perceptions. Some perceptions are unconscious, and among these are the elements of which the material world is the issue. There are also the self-conscious souls of men, containing in themselves the seeds of necessary truth, developed through experience. Creation implies the existence of the *Monas Monadum*, or Supreme Substance, whence all that is finite has been derived, and in which it all finds its explanation. The universe is thus a vast collection of unextended spiritual forces, which evolve themselves in a pre-established harmony or cosmical order, and which, in its final issues, constitutes a scheme of optimism. The created universe is a harmonious theocracy which expresses the attributes of the one perfect Being. From his eternal throne its several streams of elementary existence have taken their rise. They have flowed, and they must continue to flow, in the courses into which he sent them in the beginning; and notwithstanding the dark shades in which many of them are enveloped, they are recognized by Omnipotence as the only possible, and therefore most glorious illustration by creation of the pure fountain in which they originated. The speculations of Leibnitz, like those of Berkeley, though by a different route, thus conduct to immaterialism. Leibnitz refused to recognize the interaction of mind and matter. Apparent instances of such interaction he resolved by his doctrine of pre-established harmony; and this he likened to two clocks which, if accurate, would always correspond in their changes, although neither of them influenced the other.

LEICESTER (pronounced *Les'ter*), a central English county, bounded N. by Nottinghamshire, N.E. by Lincolnshire, E. by Rutlandshire, S.E. by Northamptonshire, S.W. by Warwickshire, and N.W. by Derbyshire. The greatest length, north by east to south by west, is 41 miles; the greatest breadth, at right angles to the length, is 40 miles. The area is nearly 800 square miles, or 511,719 acres. The population in 1881 was 321,258.

Surface, Rivers, &c.—The surface of Leicestershire consists almost entirely of gently rising hills. The northern part is occupied by the southern extremity of the Kesteven Cliffe Bow. The south-eastern portion is occupied by the hills which separate the basin of the Soar from that of the Welland. The north-western portion constitutes the district which, though now bare of wood, retains its ancient designation of Charnwood Forest. This district is occupied by a group of hills of inconsiderable elevation, but of a rugged character, with distinct and sharp prominences. Bordon Hill, between Leicester and Ashby, 853 feet high, has one of the most extensive prospects in England.

The eastern portions of the county are mostly occupied by the coals, the lias, and the intermediate formations. The rest of the county, with the exception of Charnwood Forest, the coal-fields near Ashby-de-la-Zouch, and some isolated hills of mountain limestone to the north-west of Charnwood Forest, is occupied by the new red sandstone. The Ashby coal-fields lie one to the north-east, the other to the south-west of the town, and extend into Derbyshire. Isolated beds of mountain limestone are quarried in many places. Charnwood Forest district is occupied by rocks of the transition series, arenite, granite, greenstone, and slate. Coarse slate, gypsum, limestone, freestone, and brick-clay are procured within the county.

Leicestershire is chiefly included in the basin of the Trent, which just touches the county, and for a few miles

divides it from Derbyshire. The principal tributary of the Trent belonging to this county is the Soar, which is formed by the junction of several small streams that rise near the south-western border of the county; it flows past Leicester and Loughborough to the Trent, which it joins about 12 miles east-south-east of Derby. It is navigable for barges to Leicester. The Wreak rises in Rutlandshire, and joins the Soar near Mount Sorrel. The Anker skirts the border of the county; near Atherstone it joins the Tame, a feeder of the Trent, at Tainworth. The Sence joins the Anker. The Mease, the Devon, and the Smyte are small feeders of the Trent. The Avon, a tributary of the Severn, forms the boundary of the county for 7 or 8 miles on the southern side. The Swift, a small stream which flows by Lutterworth, falls into it. The Welland forms part of the Northamptonshire boundary of the county.

Leicestershire is traversed by the Midland Company's Railway, and is connected by canals with all parts of the kingdom.

Climate and Agriculture.—The climate of Leicestershire is mild and genial, without being so moist as in those counties which lie nearer the Atlantic. There are few high hills to intercept the clouds. The soil is loamy, without the extremes of stiff clay, loose sand, or chalk. The most fertile soils are almost invariably kept in pasture, for which this county is pre-eminent. Out of the entire surface, more than one-half is in permanent grass. The quantity of wood or wastes is very small. Grazing and breeding cattle and sheep are the chief objects of the Leicestershire farmers, and they have succeeded admirably both with oxen and sheep. The manure thus brought upon the fields, and the large culture of turnips and green crops for the cattle, keep the arable land in good condition. Farms are of all sizes, and generally held by tenants at will. According to the agricultural statistics published in 1885 there were 475,000 acres—or nine-tenths of the total area—under cultivation. Corn was grown on 84,000 acres; green crops on 22,000; clover on 21,000; and 330,000 acres were permanent pasture. The number of cattle in the county was 140,000, and of sheep 310,000.

The county contains many large dairies, and produces excellent cheese, especially the well-known Stilton, most of which is made here. The principal breed of cattle in Leicestershire is the improved longhorn. The Leicestershire sheep are also renowned. They are large, with very long wool, and fatten very readily at an early age. This county is also pre-eminent for its breed of horses, hunters and large black cart-horses being reared in large numbers at Melton and other places. The rich pasture favours the rearing of this useful animal. Hogs have been improved in Leicestershire, as well as other animals.

Trade and Manufactures.—The manufactures include every branch of plain and fancy hosiery on the most important scale; the making of elastic webs and braids, boots and shoes, ribbons, lace, cotton, thread, and light wares, weaving and knitting frames, machinery, steam-engines and boilers, agricultural implements, artificial manures, and the various manufactures required for the supply of local wants. According to the last official return published, there were in the county seventy-four hosiery factories, employing 5111 persons; seventeen woollen factories, employing 1659 persons; twenty elastic web factories, employing 2374 persons; and eleven cotton factories, employing 1372 persons. There are twenty-five collieries, which annually produce about 1,000,000 tons. Ironstone and lead are found to some extent, limestone and sandstone are extensively quarried, and gypsum is worked about Leicester.

Divisions and Towns.—Leicestershire is divided into six hundreds and more than 200 parishes. It is in the diocese of Peterborough and province of Canterbury, and in the Midland circuit, the assizes being held at Leicester.

Since 1885 the county has been divided into four single-member constituencies. Two members are also returned for the borough of Leicester.

History.—In the time of the early Britons the county was occupied by the *Coritani*. There were several Roman stations, and many remains of their settlements have been found. The chief historical event is the battle fought at Bosworth Field in 1485.

LEICESTER, 98 miles from London by the Midland Railway, a parliamentary and municipal borough, and the capital of the above county, is on the east bank of the Soar, across which there are five bridges. Considerable commercial progress has been made in Leicester during the last few years. All the characteristic manufactures of the county are actively carried on in the town, which now fairly competes with Northampton in the making of pegged and riveted boots and shoes, and is only equalled by Nottingham in its manufactures of hosiery. Commensurate with its industrial progress has been the improvement and extension of the town generally. Streets have been widened, and improved by the substitution of buildings of architectural merit for old tenements. The drainage has been remodelled, the sewage utilized to some extent, a superior water supply obtained, public walks and parks provided, public baths erected, a cemetery formed, 25 acres in extent, and a fine park, 70 acres in extent, was opened in 1882.

St. Martin's Church, the largest in the town, was restored in 1867, the work comprising a new spire 218 feet high; in the same year the commodious Church of St. Matthew was completed; it has 1000 sittings, all free. The oldest church in the town is that dedicated to St. Nicholas, which is partly constructed of bricks and stones taken from the Roman city wall; but the Church of St. Mary de Castro, with its Norman chancel and a porch and other features of that style, the later portions being from Early English to Perpendicular, has more architectural interest. St. Margaret's, chiefly of Perpendicular Gothic, with a lofty embattled tower about 100 feet high, occupies the site of the ancient Saxon cathedral which was removed to Dorchester (the small place of that name in Oxfordshire), and afterwards to Lincoln. There are several other churches and numerous dissenting chapels, including a large congregational chapel in the London Road, accommodating 1200 persons, and a spacious Gothic Baptist chapel, with spire 150 feet high. A town-hall was opened in 1876. The building is of Suffolk brick and Ketton stone, and is in one of the popular Queen Anne styles. The principal front is 216 feet long, and from 60 to 80 feet high; the depth is 118 feet. A massive clock tower, 145 feet high, is an important feature. The building comprises assize courts, borough courts, police courts, handsome suitor's hall, municipal offices, school-board offices, large club room, and richly ornamented council chamber. The old town hall is a building of the Elizabethan period, which was opened, in 1588, with a grand banquet of special rejoicing for the defeat of the Spanish Armada. The other principal buildings are the corn-exchange, a temperance hall accommodating 1600 persons, county and assembly rooms, a concert hall, mechanics' institute, museum of the Philosophical Society, fine-art museum, town library, theatre, several banks, Albion Baths, on the New Walk, a promenade a mile in length; Church of England collegiate school; Wigston's free grammar-school, considerably extended in 1879; Trinity Hospital, founded in 1354 by Henry le Bossu, earl of Leicester; county infirmary, union workhouse, and county lunatic asylum. The borough has many valuable charities, hospitals, and schools. A clock-tower, designed by Mr. J. Goddard, of Leicester, was erected in 1869 in memory of the four great benefactors of the town—Simon de Montfort, earl of Leicester; William Wigston, Gabriel Newton, and Sir Thomas White. The tower is square,

Gothic, with a spire rising from the gabled clock-faces. In 1872 a statue was erected to the memory of the Rev. Robert Hall, the eminent Baptist minister, who resided in the town eighteen years.

The spring and summer assizes and courts of quarter sessions are held in Leicester. The town has returned two members to Parliament since the time of Edward I., and the representation was left undisturbed by the Redistribution of Seats Act of 1885. The municipal borough is divided into seven wards, and is governed by fourteen aldermen and forty-two councillors. In 1861 the population was 68,056; in 1881 it had increased to 122,351.

There is a mythical tradition that Leicester was once the abode of the British King Lear, or Lair, and his three daughters, whose story is preserved by Shakspeare's immortal tragedy. It is certainly the site of the important Roman military station of *Ratae*, with a Roman town noticed by several writers for its stately mansions and temples, some remains of which have been discovered. The name also of the *Rhedegna*, the Roman racecourse for charioteers, is traceable in that of the Rawdikes, a place near the junction of the Burton Railway with the main line of the Midland Company. Under the Saxon Kings of Mercia, Leicester was the seat of a powerful earldom, and in the wars between the Danes and Saxons became the theatre of conflict; and its resistance, at a later period, to William the Norman brought more carnage and havoc to the town. In 1173 it was almost destroyed, in consequence of the disaffection of the Earl of Leicester to the Plantagenet king; and its castle, together with that of Groby, a few miles distant, was nearly razed to the ground. Leicester Castle was rebuilt, however, in the next century, by Simon de Montfort, the great earl of Leicester, and was enlarged at a later date by the addition of the New Work or Newark. Leicester Abbey was founded in 1143 by Robert le Bossu, the humpbacked earl of Leicester, as a monastery of Black Canons; and was further endowed by his daughter-in-law, Petronilla, who gave a long plaited tress of her hair for a rope to suspend the lamp in the chapel. Cardinal Wolsey expired in this abbey on the 29th November, 1530, having been compelled by sickness to take refuge here when on his way to London to be tried for high treason. Leicester was besieged in 1645, during the Civil Wars, when it held out against Charles I. The stocking-frame was introduced about the close of the seventeenth century.

LEICESTER, ROBERT DUDLEY, EARL OF, was born about 1531. His father, the Duke of Northumberland, was executed for his adherence to Lady Jane Grey. The son was imprisoned for a time, but was soon liberated, and afterwards made master of the ordnance by Queen Mary. On the accession of Queen Elizabeth he became a favourite, and received at her hands gifts and titles, the earldom of Leicester being the last and highest. To retain this favour, or, as it has been suggested, in order to marry Elizabeth, Dudley is suspected of having, in 1560, caused the death of his wife, Amy Robsart, whom he had married when very young. He is also accused of having instigated an attempt which was made to poison Lady Sheffield, by whom he had a son; and for this crime, if he committed it, he doubtless had a similar motive. His marriage with the widow of Lord Essex was very nearly depriving him of the queen's favour; but notwithstanding her temporary anger, his influence over her remained undiminished. This marriage, too, involved another case of suspicion: Lord Essex had died in a very unaccountable manner two days before it took place.

Successful as a courtier, Leicester proved his inefficiency as a soldier by his conduct of two separate commands with which he was intrusted in the Low Countries in 1585 and 1587; and it was found necessary in both cases to recall him. The last trust conferred upon him was in 1588,

when he was appointed lieutenant-general of the infantry mustered at Tilbury Fort, for the purpose of resisting the Spaniards. This was the year of his death, which took place at Cornbury, in Oxfordshire, on 4th September. It was in the previous year that he advised Elizabeth to put Mary Queen of Scots privately to death.

LEIGH, a manufacturing market-town of England, in the county of Lancaster, situated 12 miles west of Manchester, and 194 miles from London by the London and North-Western Railway. The town does not contain many buildings of importance, the ancient parish church, a lofty stone edifice almost entirely rebuilt in 1873, an old grammar-school with endowments dating from 1655, and the workhouse being the only edifices or institutions worthy of notice. There are extensive collieries in the vicinity, and several flour-mills, glass-works, foundries, and breweries, but cotton and silk are the chief manufactures. The population of the town in 1881 was 21,734.

LEIGHTON-BUZZARD, a market-town of England in the county of Bedford, situated on the Ouzel, a tributary of the Ouse, 5 miles S.W. of Woburn, and 10 miles N.N.W. of London by the London and North-Western Railway. The town is well built, and has a town-hall, corn exchange, and several schools. There is a fine pentagonal cross in an open area near the market-house, supposed to have been erected at the beginning of the fourteenth century; it consists of two stories, and is 38 feet high. The church, formerly collegiate, is a large cruciform Gothic structure, with a tower and steeple rising from the intersection of its nave and transepts. Lace-making, formerly a considerable branch of industry in Leighton-Buzzard, has been all but extinguished. Straw-plaiting here, as in other towns of Bedfordshire, employs many females, and there is some trade in corn and timber. The population of the town in 1881 was 8278. The word buzzard is said to be derived either from Buzzard or Bosant, the name of an ancient family, or to be a corruption of *Beau-desert*.

LEI NINGEN, formerly a county of Germany, situated between the Lower Palatinate and the bishoprics of Spire and Worms, gives title to one of the German princely houses. The principal line obtained in 1779 the dignity of princes of the empire. In 1803 it lost its possessions on the left bank of the Rhine, and obtained, instead, a territory of 515 square miles, 425 of which are in Baden, 110 in Bavaria, and 10 in Hesse-Darmstadt. The principality was mediatized in 1806, but though no longer an independent prince Prince Leiningen retains his wealth and rank. His possessions are within the territories of Baden, Bavaria, and Hesse. The prince's residence is at Amorbach, in the Breunau Odenwalde. The religion is Lutheran. There are four other branches of the house of Leiningen, two Lutheran and two Catholic; the head of each branch has the title of count.

LEINSTER, a province of Ireland, containing the counties of Carlow, Dublin, Kildare, Kilkenny, King's County, Longford, Louth, Meath, Queen's County, Westmeath, Wexford, and Wicklow. It is bounded E. by the Irish Channel, S. by the Irish Channel and the county of Waterford, W. by Limerick, Galway, Roscommon, and Leitrim, and N. by Clonmacnoise, Monaghan, and Armagh. The greatest length, from the mouth of Waterford Harbour to the head of Carlingford Bay, is about 138 miles; the greatest breadth, from the Shannon, a little below Shannon Harbour, to Dalkey, near Kinstown, is about 80 miles. The entire area is 4,940,319 statute acres, and the population in 1881 was 1,279,190.

Of the four provinces of Ireland, Leinster possesses the greatest advantages in point of soil and surface, being little or unimpaired with mountains, and having consequently superior facilities for internal communication. The navigable Shannon forms part of its western boundary, and the navigable Barrow intersects its central and southern counties. The Boyne also, the basin of which lies within its north-

eastern limits, is partly navigable, and the Royal Canal and Grand Canal traverse it from east to west. The coast is inferior in point of natural harbours to that of the remainder of the island, but it is more sheltered from the prevalent winds.

Upon the invasion of the English in 1170, the present province was divided into the two petty kingdoms of Meath and Leinster, and embraced also a part of the then kingdom of Ulster, in the present county of Louth. The first counties erected were those of Dublin, including the present county of Wicklow; Meath, including the present Westmeath and Longford; Louth; Kildare, including the present King's and Queen's counties; Carlow, Kilkenny, and Wexford. Meath was divided into Meath and Westmeath in the reign of Henry VIII.; King's County and Queen's County were separated from Kildare, and erected into separate counties, in that of Mary; Longford was made shire-ground in the time of Elizabeth; and Wicklow was finally separated from Dublin and made a county in the reign of James I.

The ancient kingdom of Leinster, including all the counties south of Meath, with the exception of Dublin, was inherited by the descendants of Eva, daughter of Dermot MacMurrough and wife of Earl Strongbow. Meath was bestowed on Hugh de Lacy, and descended to the families of De Verdon and Geneville. Almost all the inheritors having ultimately become absentees, the native Irish of Carlow, King's County, Queen's County, and Westmeath seized on their estates, and obliterated all traces of the English law from the western and some of the midland parts of the province; nor was it till the reign of Elizabeth that the whole was brought again under a regular government. The counties of Louth, Meath, Dublin, Kildare, and Wexford have not shaken off the English law or abjured English manners at any time since their first conquest.

Leinster gives the title of duke to the Fitzgerald family, whose head is the sole duke and premier peer of Ireland.

LEIPOA, is a genus of birds belonging to the family of MOUND-BIRDS (Megapodidae). One species is known, *Leipoa ocellata*, called the Native Pheasant by the Australian colonists. It is a large bird, measuring nearly 2 feet in length. The head is blackish-brown in colour, and furnished with a crest of slender feathers; the back of the neck is dark gray. The whole of the feathers of the back and wings are marked towards the tips with bands of brown, black, and grayish white, the paler colour occupying the margin of the feathers, and thus giving the plumage an ocellated appearance; the tail-feathers are blackish-brown, broadly tipped with buff; the lower surface is pale buff, with some black bands on the flanks; the front of the neck bears numerous elongated black feathers, with a white line down the centre of each.

This handsome bird is an inhabitant of Western Australia, where it dwells principally on the barren sandy plains of the interior. Its food consists chiefly of seeds and berries. The eggs are deposited in a mound, usually about 3 feet in height, composed of layers of dead leaves and other vegetable matters, and covered with a coating of sand. The natives, who are very fond of the eggs, wait until the mound is completed and covered up, when they easily secure the whole stock, and the hen birds will then lay a second, and even a third time. When broken up, the mounds are always found to be tenanted by vast numbers of ants.

LEIPZIG, the second city in the kingdom of Saxony, stands on an extensive plain watered by the Pleisse, at a distance by railway of 65 miles N.W. from Dresden, and 133 S. by W. from Berlin. The town was formerly well fortified, but the ramparts have been converted into public walks and gardens. The only remaining part of the fortifications is the castle, called the Pleissenburg, upon which the observatory now stands. This town is the largest

commercial place in East Germany, and is situated on the White Elster, where it is joined by the Pleisse and Parde. The population in 1881 was 149,081, nearly all Protestants. If, however, those who work in it daily, but reside in the suburbs, be added, it would make a total of nearly 200,000.

Leipzig is not regularly built; the older streets are generally narrow, though well paved and lighted; but it contains many very handsome parts, numerous elegant public buildings, private houses resembling palaces, and many seats, with fine gardens, in the suburbs. The most remarkable edifices are—the churches of St. Thomas, St. Nicholas, St. Paul, and St. John; the university buildings; the theatre, and the town-hall, built in 1599; the palace, formerly the residence of the electors and kings of Saxony; the cloth-makers' and booksellers' halls, and post-office. A handsome monument to Luther and Melancthon was erected in 1883. The great building called Auerbach's House is, in the time of the fairs, a kind of bazaar, where the finest and most costly articles are exposed for sale. There are numerous excellent schools, academies, and many literary and learned societies; a deaf and dumb institution; orphan and lunatic asylums; an academy of design, painting, and architecture; many museums; a large public library of 100,000 volumes and 2000 MSS., with a cabinet of 6000 coins and medals, and a botanical garden. Leipzig is one of the most important cities in Europe, owing to its university, its Conservatorium of Music (in which Mendelssohn taught and Sterndale Bennett and Sir Arthur Sullivan studied), its fairs, and its book trade.

The university was founded by the Elector Frederick and his brother William, on the 11th December, 1409, which is the date of the bull of Pope Alexander VI. confirming the foundation. During its whole existence of more than four centuries, it has enjoyed the reputation of being one of the most eminent in Germany. The library consists of 350,000 volumes and above 1,000 MSS., and is particularly rich in works on philology, medicine, and divinity. The university has attached to it a museum of natural history and a botanic garden, sixty professors, and seventy private teachers. The *Augustum*, the chief building of the university, contains a very valuable library.

The origin of Leipzig was a Slavonian village that stood in the fork between the Parde and the Pleisse. This is said to have received its name from the lime trees growing about it, which are called, in Slavonian, Lipp, Lipa, or Lipsk. It is not spoken of as a fortified town till the twelfth century, under Margrave Otho the Rich, who granted it a license to hold two fairs, at Easter and Michaelmas. The first fair at the New Year was proclaimed in 1158, and the three fairs were confirmed by the emperor in 1507. These fairs have laid the foundation of the prosperity and wealth of Leipzig. They are attended by a vast concourse of merchants from most countries of Europe and Western Asia, and the value of the manufactured goods of all kinds sold annually is estimated at about £10,000,000 sterling. The goods brought to the fairs are chiefly woollen and cotton manufactures, iron and hardwares, leather, linen, paper, porcelain, silks, hides, furs, glass, drugs, cocoa-nut and palm oils, &c.; large quantities of English soft goods are also sold. There are manufactures of silk and half-silken fabrics, hosiery, leather, oil-cloths, playing cards, tobacco, gold and silver articles, snuff, chocolate, starch, soap, liqueurs, and musical instruments, with numerous engraving, dyeing, and wool-spinning establishments. But the singular concentration of the German book trade in Leipzig has been the main cause of the celebrity and wealth of that city. The first two booksellers, who were also printers, that settled in Leipzig were Steiger and Boskopf, in 1545. It is now the grand emporium of the book trade of Germany, in which more than 250 houses are engaged, having connection with 3500 houses out of Leipzig. The importance of the publishing business may be judged from the numbers of orders disposed of at the

booksellers' exchange or clearing house. The average of such orders is about 60,000 a day, or about 18,000,000 a year. The number of works published in Leipzig annually exceeds 12,000. Printing is carried on by over sixty firms, employing about 2500 men, women, and apprentices. A natural result of the active printing and bookselling trade is a brisk business in paper, which is valued at not less than £300,000 a year. An annual fair is held for the sale of books, which is attended by purchasers from all parts of Europe. Leipzig is the principal centre for musical publications, not only in Germany, but throughout the musical world. At the present time there are over thirty publishers in this department.

Leipzig has suffered at different periods from the miseries of war. In September, 1631, the great victory obtained by Gustavus Adolphus over Tilly was fought on its plain; and in 1612 it was besieged by the Swedish general Torstenson. The fearful conflicts of the 16th, 17th, and 18th of October, 1813, in which Napoleon was defeated by the allied armies under Prince Schwartzberg, took place near the town; in the village of Probstheida, which was in the centre of the combat, a colossal cross has been erected to commemorate the terrible battle; and the fiftieth anniversary was commemorated 19th October, 1863, by veteran survivors and an immense multitude. In the war between Austria and Prussia, in 1866, Leipzig was occupied by the troops of the latter country. In 1877 the city was made the seat of the court of appeal for the German Empire.

LEITH, a seaport town and contributory parliamentary burgh in Edinburghshire, is situated on the banks of the Water of Leith, a stream which divides the town into North and South Leith, and is crossed by stone and other bridges, at its confluence with the Frith of Forth, 339 miles from London, and about 2 miles N.E. from the city of Edinburgh, with which it is connected by a broad street called Leith Walk. The tramways which pass along this fine road every few minutes, and the accommodation afforded by the North British and Caledonian railways, conduct a great traffic from one town to the other. Improvements have been going on for many years in the buildings and thoroughfares of the town, and broad and fine streets and handsome houses are continually taking the place of the narrow and ill-paved alleys and streets which formerly afforded means of communication. It is unfortunate, however, that the number of places of historical interest are necessarily continually decreasing in number. Shore Street in Old Leith, which was formerly, by the Kirkgate, the chief route for traffic from the harbour, still has an old-world look, and curiously recalls the appearance of some of the streets in the old provincial towns of France. The more modern streets, such as Great and North Junction Streets, Bernard Street, and Constitution Street are all open and spacious, and contain many fine buildings and remarkably handsome shops. The principal buildings include four places of worship belonging to the Established Church of Scotland, the chief of which are—North Leith parish church, which has taken the place of St. Ninian's, an insignificant building erected about the sixteenth century and now used as a store; the present church was renovated in 1881 and has a spire 110 feet high; and South Leith parish church, a fine edifice of the fifteenth century; four belonging to the Free Church, all of which are fine buildings; four belonging to the United Presbyterian Church; an Episcopal church, a highly ornamental building in the Pointed thirteenth century style; a Roman Catholic and an Independent chapel; a Baptist and a Wesleyan church, and a Scandinavian church for the benefit of the seamen frequenting the town; a handsome court-house or town-hall; a corn exchange, with great hall 110 feet by 70 feet, for public meetings; exchange and assembly rooms in the Grecian style, with a large news-room; custom-house; dock warehouses; chamber of commerce; sailor's home;

baths; public library of 10,000 volumes; mechanics' subscription library, with 7000 volumes; a public institute; Philharmonic Society; Nautical School; Dr. Bell's and several board schools; Marionville Girls' School of Industry; Trinity House for Shipmasters, an institution founded 1555; Gladstone Asylum for Incurables, near St. Thomas' Church; Hawkfield-house Lunatic Asylum; and Leith Hospital and Dispensary. Among the charitable institutions not noticed above are—John Watt's Hospital and a ragged industrial school. Among the banks the Union offices are worthy of mention. Half-way to Edinburgh, on Bonnington Road, is the Edinburgh and Leith Cemetery.

The port of Leith is superintended by a Board of Commissioners. A tidal harbour has been gradually formed by running out piers of wood and stone across the sands; the east pier being 3530 feet, and the west 3120 feet long. It has a depth of from 20 to 25 feet at high water. There are now five wet docks in connection with the port of Leith—three on the west side and two on the east of the inner harbour. All these docks have been constructed within the present century. What is familiarly known as the Old Dock was opened in 1806. The Queen's Dock, which is an extension of the Old Dock towards the west, was completed in 1817. They are each 250 yards long by 100 yards broad, with an area together of $10\frac{1}{2}$ acres. Three graving docks were constructed at the same time, each 136 feet long by 45 wide at the bottom, and 150 long by 70 wide at the top. The entrance is 36 feet in width. The Victoria Dock, north of the Old Dock, was opened in 1852. It is 700 feet long by 300 broad, has an area of $4\frac{1}{2}$ acres, an entrance 60 feet wide, and a depth of 21 feet at the lowest neap tide. A large graving dock, the Prince of Wales Graving Dock, 370 feet long and 60 broad at its entrance, was opened in 1858. The great increase of trade and shipping again requiring additional dock room, it was necessary to encroach upon the sea, and the reclamation embankment now completed was begun, and the Albert Dock was completed in 1869. The additional accommodation thus provided was very soon found to be insufficient, and the Edinburgh Dock was then constructed. The Albert Dock is 1100 feet long and 450 feet broad; it has a depth of $20\frac{1}{2}$ feet at high water of spring tide and an area of $10\frac{1}{2}$ acres. The entrance to the dock is 60 feet wide and 350 feet long, and is approached from a basin 2 acres in extent. Access to the Edinburgh Dock, opened in 1881, is through the Albert Dock, and the connecting passage is spanned by a massive swing bridge, which is adapted both for railway and for ordinary traffic. The dock is 1500 feet long and 650 feet wide; but there projects into it from the middle of the eastern end a jetty 1000 feet long and 250 feet broad. At that end, therefore, the breadth of water on each side of the jetty is only 200 feet. It has an area of $16\frac{3}{4}$ acres, and at the west end of the jetty there is a graving dock 300 feet long. Leith Fort, half a mile west of the Custom-house, is an artillery station. A branch rail unites Leith with the fishing town of Newhaven and Granton pier, erected by the Duke of Buccleuch. The Caledonian Railway Company have also formed a large station at the west end of the Old Dock on ground reclaimed from the sea. Steamers run from Leith to Aberdeen, Alloa, Copenhagen, Dantzic, Opoto, Dunkirk, Hamburg, Hull, Kirkwall, London, Newcastle, Pillau, Rotterdam, Stettin, St. Petersburg, Thurso, Wick, and Lerwick.

The chief commerce of Leith consists in its colonial and foreign trade, and imports of grain, for which it is the great emporium in Scotland. The other chief imports are wine, oil, flax, and wool. The exports are coal, iron, spirits, ale, paper, linen, &c. It has a considerable shipping trade, and there are also several breweries and distilleries. The manufactures consist principally of rope and sail-making, artificial manures, candles and soap, oil-cake, ale, sugar-refining, cement making, leather manufacture,

preserved meat making, lime-juice making, brass wire-cloth weaving, painting ink and printing machinery, preserved provisions, iron shipbuilding, iron founding, and machine making. The Leith flour-mills are the most extensive and complete in the country. Fish-curing is an important branch of industry.

The number of vessels registered as belonging to the port in 1885 was 153 steamers (of 83,966 tons), and 54 sailing ships (of 11,906 tons). The entries in 1884 were 2033 (837,710 tons), and the clearances 2020 (838,529 tons). Leith was a port as far back as the eleventh century, and was formerly called Inverleith and Restalrig.

In union with Portobello and Musselburgh Leith returns one member to Parliament. The population in 1881 was 59,485. Leith was created a parliamentary burgh by the Reform Act of 1832. It is governed by a provost and four bailies, who are also admirals, and other ten councillors; has a sheriff-substitute court, and is a coastguard station.

In early times the prosperity of Leith, then considerable, was often checked by warlike conflicts: in 1541 the town was burnt by an English fleet; in 1549 it was taken possession of by the French troops who came to the assistance of Mary of Guise during the contest with the Reformed party. Cromwell repaired its fortifications with the view of keeping the Scots in order. In 1838 Leith was made independent of the city of Edinburgh, to which it had been sold in 1567, and by the jealousy of which its prosperity had been greatly checked.

This town was the birthplace of the Rev. George Wishart, and of Hugo Arnot, author of the "History of Edinburgh." The Church of St. Thomas, one of the four parish churches, and the Gladstone Asylum were erected by Sir John Gladstone of Fasque, the Liverpool merchant and the father of the Right Hon. W. E. Gladstone.

Near Leith, on the west, is Newhaven, celebrated for its fisheries. The fishers are of Jutland origin, are singularly conservative in their habits, and rarely intermarry but among themselves. The fishwives of the village are noted for their peculiar costume and vocation, and may be seen in all parts of Edinburgh selling the fish caught by their husbands or fathers.

LEIT-MOTIF, a term first given by musicians of the Wagner school to short snatches of melody with which it is increasingly the custom to label, so to speak, the leading personages of a music-drama or opera. Sometimes the leading incidents also have their *leit-motive* or guiding-themes. When the personage enters, or the course of the action suggests him forcibly, his leit-motif is heard. The idea is not a new one. In the very first opera written the characters are each one accompanied with a peculiar combination of instruments throughout the part, evidently with the view of creating a musical atmosphere around it; so also with Bach in his "Passion," a century later. It was Berlioz who proceeded from the accompaniment to melody, and invented the notion of a "fixed idea" (*idée fixe*) running through a long series of pieces and connecting them by its dominating thought as it appears now here, now there, whenever it is appropriately to be expected. Wagner drove this excellent notion to extremes, and all the chief characters in his operas have their little labels in music, to the point of pedantry. But the thing in itself, when not overdone, is so true and helpful that musicians cannot now let it go, and not a work of any importance appears without its *leit-motive*.

LEITNERIEÆ is a small order of plants founded by Bentham and Hooker in their "Genera Plantarum." It consists of a single genus, *Leitneria*, containing only two species, one a native of marshes in Florida, and another of Texas. *Leitneria floridana* is described as a shrub with leaves which remind us of willows or chestnuts. The flowers appear before the leaves in the axils of the fallen leaves; they are arranged in catkins, the male and female on separate plants. There are about six stamens in the

axil of each male bract. The stamens are often surrounded by a few small bracts, which are occasionally combined into a kind of perianth. In the female flower, which is also surrounded by the same kind of perianth, there is a single carpel with a one-celled ovary; the style is long, curved outwards, with its inner surface stigmatic. The fruit is fleshy, with a hard stone; the seed has a small amount of albumen, covering a straight embryo with flat cotyledons.

Leitneria is placed by Bentham and Hooker among the series *Unisexuals* of the *MONOCHLAMYDEÆ*.

LEITRIM, a maritime county of the province of Connaught in Ireland, is bounded N. by the Bay of Donegal and by Donegal county, N.E. by the county of Fermanagh, E. by the county of Cavan, S.E. and S. by the county of Longford, and S.W. and W. by the counties of Roscommon and Sligo, from the former of which it is separated by the river Shannon. It extends from N.N.W. to S.S.E. 51½ miles, varying in breadth from 5½ miles to 21 miles. The area is 613 square miles, or 392,363 acres. In 1881 the population was 89,795; in 1811 it was 155,309—so that there was a decrease of 65,500 in forty years.

The outline of Leitrim is very irregular, being contracted in the centre to little more than the breadth of Lough Allen. The district lying south and east of Lough Allen is an irregular parallelogram of about 17 miles by 18. This is to a considerable extent encumbered with narrow and steep ridges of low elevation, and there are many small lakes, of which one of the largest is Lough Rinn, about 2 miles in length by 1½ mile in width. Northward from Lough Rinn extends an open undulating plain, interspersed with numerous lakes and streams as far as the southern extremity of Lough Allen. This district forms part of the great limestone plain of Ireland, and contains some patches of excellent arable land, but is in general more adapted for grazing. The main drainage of the limestone district is south and west to the Shannon, but several considerable streams run east to the lakes on the border of Cavan. Of the latter the principal is the river Dale. A cluster of lakes, of which the largest are called Lough Seur and St. John's Lough, occupies a tract of about 6 miles in length on the north of this level district, and there are upwards of fifty other lakes, varying in size from a quarter of a mile to a mile in length, scattered throughout the same portion of the county. North-west from Lough Allen is a low tract, in which the river Bonnet flows. With this exception, the northern part of Leitrim is covered with mountain-groups, none of the elevations of which exceed 2000 feet. Lough Macnean and Lough Melvin extend along the eastern boundary of the county, separating it from Fermanagh, in which they partly lie. They are respectively 3½ and 7½ miles in length, and are pleasingly diversified with wooded islands. The Kilcoo River connects them, and their waters are discharged into the Bay of Donegal by the Drowes. The river Duff, which separates Leitrim from Sligo, runs into the Bay of Donegal, at the eastern extremity of the coast-line. The shore is for the most part a rocky bluff, with a rough stony beach along the foot of it, and is exposed to the whole swell of the Atlantic.

The climate is raw and damp, particularly in the northern parts of the county, owing to the great extent of moory ground and the vicinity of the Atlantic. In the sheltered valleys, however, particularly in the vicinities of Dromahair and Manor Hamilton, where there is a kindly soil (often a deep dark loam, overlying limestone), vegetation is as luxuriant as in most parts of other counties in the same latitude. The surface of Leitrim is now barer of wood than most of the neighbouring counties.

The varieties of surface in Leitrim indicate the internal structure with peculiar precision. The flat-topped mountain groups, showing steep escarpments and natural terraces, belong to the millstone grit of the Lough Allen coal formation; the undulating open country has the floetz limestone for its substratum; and the rough coarse land, when not belong-

ing to the Lough Allen basin, generally consists of sandstone, conglomerate, and wacke. The rocks of the Lough Allen coal district are more analogous to the millstone grit of the north of England than to coal tracts in general. Alternations of shale and sandstone, containing beds of coal, appear wherever the mountains are of sufficient altitude; for it would seem that such a formation had originally extended over the entire district, and that the absence of those members from the lower mountains has been owing to their removal by some abrading and denuding force. At present they remain only on the summits of Slieve-an-Ieran, Lugnaculleagh, Lackagh, and on the highest part of the Muntekenney range; and the occurrence of coal in lumps throughout the sandstone, gravel, and blue-clay hills of the south and south-eastern parts of the county confirms the supposition that a portion of the coal formation has been removed. Where the millstone grit formation terminates, the floetz limestone reappears, and occupies the greater portion of the district watered by the Bonnet and its tributaries. The only primary rock within the county is along the western boundary of the valley of the Lower Bonnet, where the granite and trap formation occurs.

The soil of Leitrim is for the most part stiff, cold, and very retentive of wet, but fertile in the valleys. The best tracts are along the Shannon, the Rinn, and the Bonnet. The crops are corn, potatoes, and flax. Leitrim is, however, more a grazing than an agricultural county. Large quantities of young stock, chiefly horned cattle, are raised on the pasturable plains of the southern district. Iron and lead ores are abundant; also coal in Slieve-an-Ieran Mountain, and on the south side of Lough Allen, where it is raised to some extent.

The spinning and weaving of coarse linens for domestic use is the only branch of manufacture carried on with activity. There are three or four bleach-grounds in the county.

The county is intersected by a canal, uniting the Shannon, at Carrick-on-Shannon, with Lough Erne at Ballycouncil. The Midland Great Western Railway from Longford to Sligo passes through the southern part of Leitrim, by Newtown-Forbes, Roskey, Dromed, Drumsna, and Carrick-on-Shannon, and the railway from Farnskillen to Bandonan and Sligo through the north of this county.

Divisions and Towns.—Leitrim is divided into five baronies and seventeen parishes. The county returns two members to Parliament.

History and Antiquities.—Before the invasion of the English, Leitrim formed a portion of the territory of Breifne, of which O'Rourke was petty king, and was called Breifne or Brenny O'Rourke, to distinguish it from Brenny O'Reilly, the present county of Cavan. The whole of Brenny O'Rourke is said to have been bestowed by King John on De Lacey; the O'Rourks nevertheless continued to maintain their independence until the reign of Elizabeth, when Leitrim was first reduced to shire ground as a separate county in 1563. There were many disturbances in the county subsequently, which were not settled till 1615, when the king's title to the greater part of Leitrim was confirmed, and numerous patents were granted to undertakers by a commission appointed for the purpose of disposing of the estates of the crown in Leitrim, Longford, and King's County. Again, however, on the breaking out of the rebellion of 1611, the native Irish, headed by Sir Owen O'Rourke, seized all the places of strength in the county, with one or two exceptions. The confiscations which followed on the termination of these wars in 1650 included almost all the lands that had been allowed to remain to the native proprietors under former attainders, and may be said to have extinguished the family of O'Rourke.

The remains of antiquity in Leitrim are not very interesting. There are some ruins of the Abbey of Fenagh, celebrated during the early period of Irish church history

as a school of divinity. The Abbey of Creevelea, near Dromahair, founded by the wife of Owen O'Rourke in 1508, was an extensive pile, of which the principal walls are still standing. The remains of the other religious houses are insignificant. O'Rourke's Hall at Dromahair, Castle Longfield, Cloncarrick Castle, Castle Car, and several others now in ruins, belonged to the O'Rourkes. The strongest and handsomest fortalice, however, in the county was the castle of Manor Hamilton, built about 1628 by Sir Frederick Hamilton. It was quoined and corniced with cut stone, and was surrounded by a regular rampart with four bastions. It is now in ruins.

LE LAND, JOHN, author of the famous and valuable "Itinerary" of England under the Tudors, was king's antiquary to Henry VIII. He was born in London in 1506, was one of Lily's boys at St. Paul's School, whence he went to Christ's College, Cambridge, to Oxford, and finally to Paris. In 1530 he became Henry VIII's librarian and chaplain, and three years later king's antiquary. In 1536 he began a six years' course of travel over England, collecting by the king's order all sorts of information as to the cities, towns, and villages, their distance apart, facilities of communication, objects of interest, &c., and as to the castles and manor-houses, their situation, their value, the catalogues (of great minuteness) of their books and pictures. Six years more he spent at his own house in St. Michael le Quoin, in London, in reducing to order the vast mass of notes he had accumulated. To support him the king gave him a living near Calais, in France; then the rectory of Hasely Oxon (1542); and finally, in 1543, he was made canon of King's College (now Christchurch), Oxford. Overwork threw Land into a state of melancholia in 1550. He died in 1552. The "Itinerary" (in Latin) was published by Heame in nine vols. (Oxon, 1714). A Latin "Commentary on the British Historians," by Land, was edited and published by Hall at Oxford in 1709, and by Heame in 1744. Land's life was written by Huddesford, 1772.

LELY, SIR PETER (or Peter Van der Faes), was born in 1617 at Soest, in Westphalia. He studied under Peter Giebler at Haubem. He afterwards came to England, and was appointed state-painter to Charles I. He succeeded to that almost exclusive control of English painting which Van Dyck had held. He painted Charles I. and his court, then Cromwell and his soldiers, then Charles II. and his ladies. For this last service he was made a baronet. Many of the fine portraits in the National Portrait Gallery are by Lely. Though they are mannered, their excellence is undeniable. His facility must have been wonderful, seeing the large number of canvases which fortunately still exist. He occasionally painted historical pictures, one of the best of which is "Susanna and the Elders." His most celebrated performances are the well-known portraits of the beauties of the court of King Charles II., most of which are preserved at Hampton Court. Lely equally excelled as a crayon painter. He died in England in 1680, and Sir Godfrey Kneller filled his place.

LEMAN, LAKE. See GLISNEA.

LE MANS, a town of France, the capital of the department of Sarthe and the seat of a bishopric, is situated on a hill side, by the Sarthe, near the junction of the Huisc or Huisne, distant 131 miles from Paris, 102 from Rennes. The town was formerly a very interesting specimen of an old French provincial town, but its antiquities are fast disappearing, and it is becoming modern and commonplace. The best part of the town is up the hill, that on the river being a collection of narrow, steep, and dirty streets. The houses are chiefly of stone and slate, and the Sarthe is crossed by three bridges. The abbey buildings are used as the prefecture, which contains a library of 45,000 volumes with 500 MSS., a gallery of paintings, and a museum of natural history. There are a cathedral, which is

416 feet long, and on the site of a Roman temple, of which traces are said to be visible in the oldest part, the Norman nave, which is of the tenth and eleventh centuries, and one or two other churches of the eleventh and twelfth centuries, a house which is said to have been that of Queen Berengaria, but appears not older than the fifteenth century, and the remains of a fine Roman tower which stand near the river. A large trade is carried on in clover seed, which is sent in large quantities to England, and the town is famed for poultry. There are also some linen-mills and tanneries. The population in 1881 was 49,155.

Le Mans was the Roman *Suidunum*, or capital of the *Cenomanni* (whence the modern name), then of the province of Maine, which was held by Geoffrey Plantagenet, whose son, afterwards Henry II. of England, was born here, 1133. It was often attacked in the early times of French history, until the English were dispossessed in 1447. In 1793 it was occupied by Larochejacquelin and 60,000 Vendéans, who were driven out with great slaughter by Marceau. The Chouans also took it at their rising, in 1799. On the 11th and 12th of January, 1871, in the height of winter, the strong position taken up here by General Chanzy and his army of the West was carried by the Germans under Prince Frederick Charles, being the last great action of the war. Upwards of 21,000 of the French were made prisoners. There are the remains of three subterranean aqueducts, of the Roman period, by which the city was supplied with water from a distance.

LEMBERG, a town of Austria, the capital of Galicia, with a population of nearly 110,250, about 30,000 of whom are Jews. It is situated in a narrow deep valley, on a small stream called the Peltew, which is dry in summer. The town has greatly improved since it came into the possession of Austria. It contains many handsome buildings, broad straight streets, and lofty houses of freestone, which, with the cupolas and steeples of the cathedrals and churches, give it an air of grandeur. It was formerly an important fortress, but the fortifications have been pulled down, and low ramparts erected, which are planted with trees and laid out in public walks. This city is the seat of a Roman Catholic, a Greek, and an Armenian archbishop, and has among its public buildings a fine Dominican church, council-house, and theatre, a handsome cathedral and eighteen other Roman Catholic churches, an Armenian and a Greek cathedral, a Lutheran chapel, three Jews' synagogues, and nine convents. Besides being the residence of the governor-general and all the chief military and civil authorities of the kingdom, Lemberg has a university, two gymnasias, two theological seminaries, and numerous charitable institutions. The university was founded in 1834. The town has several breweries and distilleries, manufactures of woollens, linens, and jewelry; an important transit trade, and extensive corn and cattle markets. It is on the Vienna, Cracow, and Lemberg Railway.

Lemberg was founded in the thirteenth century. It was taken by Casimir I. of Poland in 1340. It was besieged in 1648 by the famous Cossack chief, Bogdan Khmelnicki, who threatened its extermination, but withdrew on receiving a large ransom. In 1672 it was taken by the Turks, and in 1705 it was again captured and sacked, this time by Charles XII. of Sweden, when it ceased to be of much consequence as a fortress. It came into the possession of Austria in 1772.

LEMMMA (Gr. *Umma*, literally "a thing taken or assumed"), a preparatory proposition borrowed from another subject, or from another part of the same subject, and introduced at the point at which it becomes indispensable.

LEMMING (*Myodes*) is a genus of Rodents belonging to the Mouse family (*Muridae*), and found in the northern regions of Europe and America, and more particularly in Norway, Lapland, and Siberia. The Scandinavian Lemming (*Myodes lemmus*) is remarkable on account of the extra-

ordinary migrations which it makes. It is nearly as large as our British water-rat; its colour is tawny, streaked with shades of black, and spotted with patches of white all about the under parts and the sides of the head. Its head is short, but large, thick, and well furred; the eyes and ears are small; the body is thick; the limbs, and notably the fore-legs, are clumsily thick; on each foot there are five toes, and the fore-claws are strong, compressed, and rather crooked; the tail is very short, thick, cylindrical, and covered with strong hairs disposed like those of a pencil at the tips.

The lemming burrows in the ground. It is naturally timid, but displays great courage when attacked. It feeds entirely on vegetable food, and hence in the regions which he haunts man regards him with abhorrence; for in winter these animals assemble in immense numbers, and make long journeys in quest of nourishment, devouring every herb and blade they can discover. At certain epochs, when they have largely multiplied in their mountain homes, and a consequent scarcity of food occurs, they make the most extraordinary migrations. Descending in troops from the snow-clad heights they collect in the plains, like the divisions of a great army, and then, as if by some understood agreement, march forward in defiance of every obstacle, so that nothing can divert them from their chosen course. They swim across the lakes and rivers that lie in their way, and on arriving at the opposite shore re-form in regular array. In these expeditions myriads are drowned, and myriads fall victims to the attacks of wolves, foxes, hawks, owls, and weasels, and man himself; but onward they press, devouring all the vegetation they meet with, until the ground they have passed over looks as if seathed by some destructive conflagration. These migrations invariably foretell very severe weather. During this progress, which may last several years, they breed even faster than when in their mountain homes. Finally, the sea is reached; the whole army of lemmings plunges into it and is totally destroyed. This extraordinary instance of what seems like voluntary suicide has been a subject of special investigation. Mr. Crotch has promulgated an ingenious theory. According to him the migrations are always directed westward, and terminate in the Atlantic ocean. When dry land connected Norway with Greenland the lemmings acquired the instinct of migrating westward in search of food. The sea has now submerged part of the land, but the lemmings still obey the instinct. On the other hand, Mr. R. Collett, a Norwegian naturalist, says that the wanderings take place in the direction of the valleys, and can branch out in any direction. Whenever in their progress the lemmings come across a lake or river they swim across it. When they reach the sea, which, in a land so surrounded by water, must be the goal of any such migration, they try to swim across it as they would any other piece of water. This latter theory is the simplest and most probable explanation. Several other species of lemming are known inhabiting Siberia and parts of North America; they differ mainly in size and colour from the common species.

LEMNACEÆ is a small order of plants belonging to the *MOXOCOTYLEDONS* (series *Nudifloræ*). Lemnaceæ are the smallest of flowering plants, and are found in all parts of the world, forming a green scum on stagnant water—the “green mantle of the standing pool.” There are two genera—*Lemna* (duck-weed) and *Wolffia*.

In *Lemna* the plant consists of minute fronds, which enable it to float; they produce rootlets below, tipped with a root-cap. The flowers are inclosed at first in a spathe, and inserted in a marginal chink of the fronds. There are two male flowers and one female flower together, the male flower consisting of a single stamen, the female flower of an ovary containing from one to seven ovules. *Wolffia* differs in having only one male flower and one female flower together, which are not inclosed in a spathe, and are in-

serted in a chink on the upper surface of the frond; there is only one ovule, and no rootlets. There are four species of *Lemna* found in Great Britain. One species of *Wolffia* has been found in a few places near London.

LEMNISCATA, a curve (first noticed by James Bernoulli) having the form of an 8, but with the upper and lower parts perfectly symmetrical.

LEMNOS or **STALIMENE**, one of the northern islands of the *Ægean Sea*, belonging to Turkey, situated nearly half-way between Mount Athos and the entrance of the Dardanelles, and about 22 miles south-west of Imbros. Its area is 160 square miles, and its population about 10,000, all Greeks, with the exception of the Turkish garrison and governor. The Italian name for both the island and the town is *Stalimene*. The surface is mountainous, and there are extinct craters; the western part of the island, which is more fertile than the eastern, produces wine and corn, oil, hemp, and flax, and fruits, but it is deficient in timber trees and in wood for fuel. The principal town, called *Sant Antonio*, in the south-west part of the island, is large and safe. The capital town, *Kastio*, is on the western coast, and has a citadel, harbour, and shipbuilding docks, with a population of about 1000.

Lemnos, according to Pliny, had a labyrinth more remarkable than that of Crete or of Egypt. It was supported by 110 columns, and its gates were so admirably adjusted as to be turned by a child: “*Quantum in officio turbines ita libatim pependunt, ut pueri cunæque tornantur.*” It was the work of three architects, one of whom, *Thalades*, was a native of the island. Its remains are said to have been extant in Pliny's time. (“*Hist. Nat.*,” xxxvi. 13.)

The first inhabitants are said to have been *Tiriacians*. In the reign of *Theos*, the only Lemnian king mentioned in history, the Lemnian women are said, in imitation of the *Amazons*, to have treacherously killed all the males (*Herodotus*, vi. 138); and hence any premeditated and detestable murder, or other crime, was long afterwards called a “*Lemnian action*.” The island is known, in ancient mythology, as the spot on which *Vulcan* fell after being made down from heaven. The *Athenians*, led by *Miltiades*, took the island after their conquest of the *Chetians*.

LEMON (*Citrus Lemonum*) is a name given to a plant (as well as its fruit) which is nearly allied to the orange [see *CITRUS*]; but the juice of its fruit is acid, and the perfume of its flowers quite distinct. In Hooker's “*Flora of British India*” it is considered a variety of the *Citrus* (*Citrus medica*). The lemon is cultivated throughout the Mediterranean region, and in all tropical and sub-tropical regions of the world. It is now grown in California, and in time the produce may supply the whole quantity needed by the United States. The wild stock is a native of the north-west provinces of India, attaining an elevation of 4000 feet. It is a bush or small tree; the flowers occur singly in the axils of the leaves; the petals are white within and pink on the outside. The rind of the fruit is an aromatic stomache, and is added to tinctures and infusions. It contains an essential oil, which is extracted from the little cells visible on the rind of lemons, by submitting raspings of the fruit to pressure. It may also be obtained by distilling the peel with water, but the product is less agreeable, although not so liable to undergo decomposition, owing to the absence of mucilaginous matter. When pure, essential oil of lemon is colourless and limpid; specific gravity, 0.816 at 70° Fahr.; boiling point, about 115° Fahr.; soluble in all proportions in alcohol or ether. It is used to give an agreeable odour to other medicines, and sometimes taken as a carminative in the dose of two or three drops upon sugar. From its agreeable scent it is often added to lotions and ointments. The juice of the lemon is antiscorbutic, and is also used to counteract the effects of narcotic poisons, especially opium. Dr. Garrod considers that its power against scurvy is due to the potash

salts contained in it, and, if this opinion is correct, citric acid has no value as a substitute.

LEMON, OIL or ESSENCE OF. See LEMON.

LEMON, SALT OF, is the name commonly but erroneously applied to the binoxalate or quadroxalate of potash, either alone or mixed with half its weight of cream of tartar. Its chief use is the removal of ink spots from linen.

LEMON SOLE (*Solea aurantiaca*), one of the FLAT-FISH family (Pleuronectidae), is rather thicker than the common sole (*Solea vulgaris*), and has a smaller head. It is wide in proportion to its length. As its name denotes, it is of a lemon colour, sprinkled with brown and black; there is a large black spot posteriorly. The lemon sole has a more southern range than the common sole, and is found in deeper water on the south coast of England. It attains a length of 8 or 9 inches, and is esteemed for food, but its flesh is not so firm as that of the sole proper.

LEMON, MARK, best known to the public as the first editor of *Punch*, was born in London in 1809, and educated in a private school at Chesham. His first efforts in literature were as a playwright, and he produced a considerable number of farces and small dramas. In 1841 *Punch* was established, and Mark Lemon became joint-editor with Mr. Henry Mayhew; but on the retirement of the latter Mr. Lemon took the conduct of that popular periodical, which he held until his death. In this capacity he was the fellow-worker as well as the friend of Hood, Jerrold, Thackeray, Leech, and others now well known to fame, and his genial disposition and talents were fully recognized by his colleagues. He was the author of several novels in his latter years, and appeared before the public frequently in a Shakespearean entertainment in which he impersonated *Falstaff*. He died at Crawley, in Sussex, on the 22nd of May, 1879.

LEMONADE, the name of a pleasant, cooling, antiscorbutic beverage, which is prepared in a variety of ways. A simple method is to well rub two or three lumps of sugar on the rind of a lemon, place them in a tumbler, squeeze out the juice of the lemon over them, and add cold, iced, or soda water according to taste. Where a large quantity is required a good way of making it is to pare the rind of three lemons as thin as possible, and pour over it a quart of boiling water to which has been added a quarter of an ounce of isinglass. This should be allowed to stand for a few hours, then the juice of eight lemons should be squeezed upon half a pound of lump-sugar, and when the sugar is dissolved the water should be poured upon it, and after mixing, straining, and diluting it is ready for use. It is a useful drink for allaying thirst in hot weather, and it is also very useful in febrile and inflammatory complaints. The beverage commonly sold as lemonade consists of an iced water flavoured with syrup of lemons.

LEMUR is the general name of the animals belonging to the group of LEMNORHÆA. It is strictly only applicable to the members of the Lemninae, a subfamily of Lemnidae. The Lemninae are confined to Madagascar and some of the adjacent Comoro Islands. The lemurs have a slim furry body, with a long bushy tail. All the digits of both feet, except the second of the hind foot, are furnished with flat nails. The dental formula is—

$$\begin{array}{cccc} I. & 2-2 & ; & c. & 1-1 & ; & pm. & 3-3 & ; & m. & 3-3 \\ & 2-2 & ; & c. & 1-1 & ; & pm. & 3-3 & ; & m. & 3-3 \end{array} = 36.$$

The upper incisors usually form two pairs, separated by a small space, and placed almost perpendicularly in the jaw. The lower incisors are much longer and project almost in a horizontal direction. The lower canines are similar but larger, and are considered by some as incisors. The upper canines are large, conical, compressed, and pointed. The molars are tuberculate. The eyes are large and staring. The species of the genus *Lemur* are about the size of a cat, with an elongated fox-like muzzle. These lemurs, called

makis by the French, live in troops in the dense forests of Madagascar. They are not, however, nocturnal, like most of the lemurs, though they display the greatest activity towards evening. They are very active among the branches of trees, feeding chiefly on fruits, but also on insects, eggs, and small birds. The females produce only a single young one at a birth, and attend to this with the greatest tenderness. At first they carry their offspring about in their arms, the little creature aiding its mother's efforts by clinging to her breast; but as the young lemur increases in size it mounts on the mother's back, and is thus carried about. The mammae are two in number, situated on the breast.

In confinement the lemurs are lively and playful, and the elegance of their forms and gracefulness of their actions render them most pleasing objects in our menageries, where, notwithstanding the tropical tenderness of their constitution, they have been known to live for many years, and even to breed. In general the lemurs are very gentle and harmless, fond of licking the hands of their visitors, and testify their contentment by a curious purring noise.

The Ring-tailed Lemur (*Lemur catta*) is about the size of a large cat. Its general colour is a delicate ashy-gray; the sides of the head and face, the throat, chest, and belly are white; and the long bushy tail is beautifully marked with alternating broad rings of black and white. The ring-tailed lemur is said not to be strictly arboreal, but to live chiefly among rocks and bushes. In captivity it is very gentle and playful. (See Plate LEMNORHÆA, fig. 1.)

The Mongoos (*Lemur mongoz*) is another species which is frequently brought to Europe, and indeed appears to be one of the most abundant in its native country. It is a little larger than the ring-tailed lemur, and its body is entirely clothed with a thick coat of tawny woolly hair. The sides of the face are ornamented with a pair of orange whiskers, the top of the head is black in the male, gray in the female, and the tip of the tail is also black.

The Pied Lemur (*Lemur macaco*) is remarkable for the distribution of its colours, consisting of large irregular patches of black and white. The tail and hands are entirely black, as are also the face and muzzle; a large black patch surrounds the shoulders and neck, and a still larger one occupies nearly the whole of the back, leaving only a comparatively narrow white band between it and the shoulders. The female is reddish in colour. The White-



White-fronted Lemur (*Lemur albifrons*).

fronted Lemur (*Lemur albifrons*) has a broad band of white fur encircling the forehead, cheeks, and ears. Another species is the Ruffed Lemur (*Lemur varius*).

The genus *Hapalemur* is distinguished by having the upper incisors very small, the muzzle short and blunt, and four mammae. Only one species is known—*Hapalemur griseus*, a small animal with dark gray fur. It is nocturnal in its habits, and lives in the bamboo forests of Madagascar.

The genus *Lepilemur* is remarkable for having the upper

incisors altogether absent in the adult animal, or only two in number, and very small. The Weasel Lemur (*Lepilemur mustelinus*) is 14 inches long, with a long tail measuring 10 more inches. It is nocturnal in its habits, sleeping during the day in a nest made of leaves and placed among the branches of trees. The young remain for some time in the nest. In the weasel lemur the upper incisors are altogether absent; but in another species the same genus has two small incisors in the upper jaw.

LEMURES, spectres propitiated by the ancient Romans. The Lares were the spirits of the great and good ancestors of the family. The Lemures were more akin to the troubled ghosts which our modern county families sometimes glory in possessing, spectres of criminals haunting the scenes of the crimes, or of injured souls clinging to the places where they suffered. It was common to sacrifice to both Lares and Lemures at Rome. The *Lemuria* were the May festivals yearly held to propitiate the Lemures. The sacrificers walked barefoot in procession, washed their hands thrice, threw black beans nine times over their shoulders, &c. Games were also celebrated. One tradition makes the name *Lemuria* a corruption of *Remuria*, games held in honour of the dead Remus by his brother Romulus. The letters *r* and *l* were often interchanged, as indeed they still are, in modern Italian speech.

LEMUROIDEA is a group of monkey-like animals. The name Lemur (Lat. *lemures*, ghosts) was given by Linnaeus to some peculiar little animals found in Madagascar, living among trees, and active only at night. The lemurs were placed by the great Swedish naturalist in his order Primates, among the monkeys and apes. The Linnaean genus Lemur has been broken up, and the group, enlarged by the addition of new forms, has received the name of Lemuroidea, or lemur-like animals. This group is now considered as forming either a separate suborder of Primates (or Quadrumana), or a distinct order of the Mammalia connecting the monkeys with such low generalized forms as the Insectivora. Those who take the latter view prefer the name Prosimiæ for this group.

The lemur (using the word in its widest sense) are all small animals, living among the branches of trees in forests, and feeding on fruits, insects, eggs, birds, and small reptiles. Most of them are nocturnal in their habits. Their geographical distribution is peculiar. The majority, including the most typical forms, are confined to Madagascar. They occur sparingly on the continent of Africa, reaching as far west as Senegambia. They also inhabit India, Ceylon, and the Malay Archipelago. There is evidence, however, that at one time their range was by no means so restricted. During the later Eocene and early Miocene period lemurs inhabited Europe, and probably North America also.

The lemurs have usually slim bodies, densely covered with hair, long hind limbs, large eyes, and a fox-like muzzle. The fore and hind limbs have five toes. The pollex (thumb) and the hallux (great toe) are always well developed. The latter is very large and strong, opposable to the other digits, and furnished with a flat nail. The second digit of the foot is always furnished with a claw, but all the other digits of both limbs often have nails, and in all, except in one aberrant

genus (*Chiromys*), are flattened and rounded at the tips into little pads, becoming important organs of touch. The second digit of the hand is sometimes much reduced, or even rudimentary. The forearm is capable of rotation, and the clavicles are well developed. The dentition is variable, but incisors, canines, and molars are always present, the latter tuberculate. The ears are generally very large. The nostrils are curved or twisted. The brain is comparatively well developed, but the cerebral hemispheres do not cover the cerebellum, and their surface is very slightly convoluted. The placenta is non-deciduate, diffuse or bell-shaped, and the tail is never prehensile.

The Lemuroidea are divided by Professor Flower into three families—Lemuridæ, Tarsiidæ, and Chiromyidæ, the last two families containing each only a single species. The family Lemuridæ falls into four subfamilies—Lemurinae,



Aye-Aye (*Chiromys madagascariensis*).

containing the true LEMUR (Plate, fig. 1); Indrisinae, containing the INDRIIS (fig. 2); Galaginae, containing the GALAGO (fig. 3); and Lorissinae, containing the LORIS or slow lemur (fig. 4). The family Tarsiidæ contains the genus TARSIS, with one species only, the Spectre Tarsier (*Tarsius spectrum*, fig. 5). The family Chiromyidæ contains only one species, the AYE-AYE (*Chiromys madagascariensis*), which has a squirrel-like appearance, and was at one time classed with the Rodentia.

LENA, a river of Siberia, one of the longest and largest in the world. It rises N. of Lake Baikal, 75 miles N.E. of Irkutsk, at a height of 2000 feet above the sea; flows N. and E.N.E. to Yakutsk, where it turns at first N.N.W. and finally N., and falls into the Arctic Ocean by many mouths, forming a large delta. The principal tributaries on the right bank are the Kirengh, Vitim, Olekma, and Aldan; on the left bank, the Vilui and Bakania. It has a length of about

2600 miles. The area of its basin is about 800,000 square miles. In the part of its course between Kirensk and Yakutsk there is in some places picturesque scenery, cliffs of red sandstone overhanging the wooded valley; but lower down, below Yakutsk, it flows with a broad and sluggish stream through a vast open, bare, and barren plain, where there is scarcely a human being. Here numerous remains of mammoths, rhinoceroses, &c., have been found, some of them in wonderful preservation. In the lower part of its course the Lena is 5 or 6 miles wide, and is throughout admirably adapted for navigation, having a deep and unbroken current, but during only a brief period in the summer months, as ice remains on the lower reaches till the early summer.

LENCLOS, NINON DE, a celebrated Frenchwoman of the seventeenth century, was the daughter of a gentleman of Tournai, and was born at Paris, 15th May, 1616. Her mother endeavoured to train her piously and wished her to take the veil, but her father, a man of pleasure, encouraged her to follow his example, and his influence prevailed. She was early left an orphan, and inheriting a competent fortune established herself in Paris. Remarkably fascinating in person and conversation, her list of lovers included some of the highest names in France—Condé and Coligny, Rochefoucauld, D'Albret and D'Estrées. Her career of pleasure lasted over 50 years, and she is said to have embraced three generations of one family—the Siviens—father, son, and grandson. During the latter period of her life she became the centre of a brilliant social circle, and one of the recognized leaders of fashion in Paris. She gathered in her salons ladies as well as gentlemen of the highest birth, and mothers in the higher ranks encouraged their sons to visit her house that they might see society and form their manners. She also befriended wits and men of letters. Molière read to her his "Tartuffe," and to the boy Voltaire, who was introduced to her when she had reached old age, she bequeathed a legacy of 2000 francs to buy books. With St. Evremond she maintained a long friendship, and it is in his works that the few really authentic letters of hers are to be found. She died 17th October, 1705. See Voltaire's "Lettre sur Mlle. de Lenclos," and Sardière's "Vie de Ninon de Lenclos."

LENNOA'CEÆ, a small order of plants, natives of California and Mexico, belonging to the cohort Ericales, in the GAMOPETALÆ. They have somewhat the appearance of broom-rapes and Monotropa, being parasitic, developing no green colouring matter, and the leaves being reduced to brown scales. The flowers are crowded together at the apex of the stalk; they are regular, and possess both stamens and pistil. The calyx is divided almost to the base into six to ten narrow segments. The corolla is tubular, with five to eight short lobes. The stamens are attached below the top of the tube; the anthers are two-celled, with "triplicate" pollen. The ovary is superior; there are ten to fourteen cells surrounding a thick central axis, each divided by a false partition. There are twenty to twenty-eight ovules, one in each of the spurious cells. The fruit is drupaceous-capsular, the top caving off by irregular splitting all round. The seeds are small, with a very small, undivided embryo. There are four species, placed under three genera—viz., *Lennea*, *Pholisma*, and *Ammobroma*.

LENS. A lens in optics is a portion of a refracting medium included between two surfaces of revolution whose axes coincide. If the surfaces do not meet, and therefore do not include space (as in a double-concave lens, &c.), an additional boundary is required, and this is a cylindrical surface having its axis coincident with that of the surfaces.

The axis of the lens is the common axis of all the bounding surfaces.

Lenses are distinguished by their surfaces, and their chief varieties are shown in the Plate accompanying this article. These are (1) the double-convex, (2) plano-

convex, (3) plano-concave-convex, (4) double-concave; (5) plano-concave, and (6) meniscus. The meniscus is a sort of concave-convex lens, in which the concave curvature is gentler than the convex. A familiar example of it is the old-fashioned watch-glass, with a thickened centre. These are spherical lenses, and are so much the more common that the consideration of others may be neglected; nevertheless there are conoidal lenses sometimes required by the oculist, whose surfaces are ellipsoids, hyperboloids, &c.

The power of a compound lens (fig. 7) is equal to the powers of the several separate lenses of which it is composed, all other things being the same. In the case of a lens which is a complete sphere (as a bowl of water, &c.) the focus for parallel rays is upon the posterior surface of the sphere. The foci for rays which are not parallel are shown in figs. 10 and 11, where q (the focus) is given by the proportion

$$QC : CE :: EH : Hq,$$

the light in each case coming from the left hand.

Every spherical surface has two such points— Q and q —in its axis, and the relation is such that all rays converging to or diverging from one of them shall, after refraction, converge to or diverge from the other. These points may be called the *aplanatic foci* of the surface, and Q is usually called the aplanatic focus for incident, and q for refracted rays. To find them in any instance (as fig. 12, for example) let μ be the index of refraction, for the medium of which the lens is composed (whether of glass or any other medium), then take $CQ = (\mu + 1) \times$ radius CE of the surface, which

will give Q ; and take $Cq = (\frac{1}{\mu} + 1) \times$ radius, which will

give q . In the case of reflection, when $\mu = -1$, then $CQ = Cq$, that is, $= 0$, and the aplanatic foci coincide with the vertex of the reflector.

The aberration of a lens is the variation between the focus for the central rays (usually called the focus of the lens) and that for the rays passing nearer the periphery of the lens, the rays of the outer annulus. In the case of parallel rays the focus of these exterior rays is shorter than that of the central rays. Q (the light source) is in this case, of course, infinitely distant, or the rays would not be parallel. Now, let Q move nearer to the lens C , as in fig. 13. When it reaches A , the focus for incident rays on the concave, the aberration is 0, following from what was said above as to aplanatic foci. If Q is at F , the focus for parallel rays on the convex side, the aberration is infinite. If Q is anywhere between these points, the focus of exterior rays is thrown further from the surface than the focus for central rays, and this holds good for all species of curvature. E is the centre of the surface C . In reflectors the aplanatic foci coincide with the vertex, and the focus for exterior rays is always shorter than that for central rays, except when the radiant point is between the surface and the principal focus on the concave side, and in that case it is longer.

If it is required to construct an aplanatic lens, or one which shall refract all rays for a given refractive index (μ), and converging to or diverging from any one point, it is accomplished as in fig. 12. Here let Q and q be the aplanatic foci of the spherical refracting surface $KPCpk$. With centre q and radius less than qC (or radius less than QC if the incident rays diverge from Q , as in the lower half of the figure) describe a circle KL or kl , and turn the whole figure about Qq as an axis. Then the surfaces $CPKL$ or $Cpkl$ will generate the desired lens. CE is the radius of the spherical surface $KPCpk$.

Aberration may be very greatly destroyed by the suitable use of a compound lens, as fig. 7, or of two lenses, as in fig. 8, the curvature of the second and other lenses being of course rigorously determined by those of the first.

The behaviour of oblique pencils of light is shown in figs. 14 and 15. In the first the pencils $QC, Q'C'$, give foci at q and q' ; and if QQ' be a line from every part of which rays proceed, then also will qq' be a line made up by the various foci of the rays from QQ' . But if, as in fig. 15, the surface be not single, then a ray from Q' falling on C' will have its focus in the line $Q'E'C'$, E' being the centre of the surface C' ; but the focus of the second refraction must lie along the line $Q'E''C''$, for E'' is the centre of the second surface C'' , and this focus is Q''' , and so on for further refractions, if there be more refracting surfaces.

The centre of a lens is a point in its axis where a line joining the extremities of two parallel radii of its two surfaces cuts the axis. Thus, in figs. 16, 17, 18, and 19, $E'A$ and $E''B$ being two parallel radii, join BA , and produce, if necessary, to x , and x will be the centre. E' is the centre of the surface C' , and E'' of the surface C'' .

An inverted image of an object is formed behind a convex lens beyond the focal length, as in fig. 20. Let C be the centre of the lens, AB ; and Pp, Qq , divergent rays, passing through C ; the rays cross at C , and the image is inverted, subtending at C from behind the same angle (qCq) that the object does before the lens. This is the principle of the common camera obscura (fig. 21), in which the rays from external objects are thrown by an inclined looking-glass downwards, and being received on a convex lens, are brought to their focus on a white horizontal table in a room where no other light is admitted. In fig. 21, P is the object, AB the reflector, BC the lens, and p the image on the table. If the lens used to form the image be a concave one, or if a convex reflector be used, as in figs. 22 and 23, the rays, after refraction or reflection, diverge, not from any actual points in which they cross, but from points in which they would cross if produced backwards. There is in this case only a *virtual* image formed, visible to the eye if properly situated, and appearing on the same side of the lens or the opposite side of the reflector with the object, and therefore erect.

For the formation of perfect images aberration should be destroyed; but there is only one case in which the total destruction of aberration is accomplished, and that is when rays are reflected at a plane surface (fig. 9). For here all rays from any point, P , reflected at AB will, after reflection, diverge strictly from p , its image. With lenses this absence of aberration can never be secured.

LENT (*lenten, lente*, from Anglo-Saxon *lenten*, spring) is the name given to a fast of forty days (hence its Latin name, *Quadragesima*) before Easter. This fast is of very ancient origin, but during the earlier centuries of the Christian era the observance seems to have extended over a short period. Irenæus mentions that some only fasted for one day, and others for two, and that there was no uniformity in the observance. Later it became customary to fast forty hours—from the afternoon of Good Friday to the morning of Easter Sunday—so as to cover the period during which, in the words of Tertullian, "the bridegroom was taken away from them." It was then extended by different churches three, four, or six days in the week before Easter, and at a later period to as many weeks. Finally it was settled at forty days, in memory of the fast of the Lord for that period, and as Sundays were exempted and kept as festivals, Ash Wednesday and the three following days were added to make up the full number. This was effected before the end of the eighth century, and the usage has ever since been retained in the Western Churches. In the Greek Church the fast begins on the Monday after Quinquagesima. The fast is observed strictly in the Roman Catholic Church, but in the Anglican Church, while Lent forms a special church season with its appropriate services, the observance of the fast is left very much to the discretion of individual members. The dissenting churches, as a rule, pay but little attention to this observance.

LENTIBULARIÆ is a small order of plants belonging to the *GAMOPETALÆ*, cohort *Personatæ*. The species are herbs, found either in marshes or in water. Two of the genera are found in the British Isles—namely, *Utricularia* and *Pinguicula*. *Utricularia* contains 150 species, distributed over the warm and temperate regions of the globe. *Pinguicula* has about thirty species, natives of the colder parts of the northern hemisphere, and of the Andes of South America. Of the remaining two genera, one (*Polypompholyx*) is a native of Australia, with only two species, and the other (*Gentiscia*) is Brazilian and tropical African, with eleven species. The calyx is two-lipped; the corolla is two-lipped, with a spur; the stamens are two, with one-celled anthers; the ovary is one-celled, with a free central placenta. These plants are exceedingly interesting on account of their being *INSECTIVOROUS PLANTS*, under which heading they are noticed, as well as under *LEAF*.

LENTIL is the seed of a vetch called *Ervum Lens* (or *Lens esculenta*), which has been cultivated and used as food from prehistoric times throughout the Mediterranean region. The Arab word is *Adas* or *Adas*, and it is therefore most probable that the Old Testament word *Adashim* refers to the lentil, and that Esau's red pottage was made of it. It was in use in the bronze period in Switzerland, as it has been found in the relics of the lake-dwellings. Aristophanes, in one of his plays, mentions the lentil as being used for food by the poor. The Latin name was *lens*, and from the shape of the seed the optical lens has derived its name. De Cudolles ("L'Origine des Plantes Cultivées") concluded that it existed wild in Western temperate Asia, in Italy, and Greece; that it was cultivated in these countries even in prehistoric times, and introduced first into Egypt, and at a later period into Western Europe and India.

There are two varieties met with in commerce—the French or German, of an ash-gray colour outside and yellow inside; and the Arabian or Egyptian "red lentil," with a dark skin and of an orange-red colour inside, smaller and rounder than the French.

Lentils are one of the most nutritious of vegetable substances, and have therefore attracted a good deal of attention among vegetarians. The seed-coat, as in most Leguminosæ, is very indigestible, but if this be removed the remainder will be found to contain a large proportion of legumin or vegetable casein. According to Prof. Church ("Food") there is as much as 21 per cent. of the nutritious casein and other nitrogenous material, 49 per cent. of starch, &c., 24 per cent. of fat; the rest being water, mineral matter, &c. Breadcrumbs and croutons, which are sold at a high price as food for invalids, are composed of lentil flour, with a mixture of barley or wheat flour, &c. Hassel mentions as a cheap substitute for revalenta the following mixture:—Red lentil flour, 2 lbs.; barley flour, 1 lb.; salt, 3 oz. The bitter vetch or tace lentil (*Ervum Ervilia*) is sometimes substituted for the true lentil, with very bad effect, as it possesses poisonous properties.

LENTO, one of the slowest *tempi* or paces used in music. The word means "slow" in Italian. This tempo is slower than *adagio*, but not so slow as *largo* or *grave*.

LENTULUS, the name of one of the principal patrician families of ancient Rome, the chief family of the great clan or gens Cornelia, another family of which was that of Gracchus. It was a Lentulus who, in 320 B.C., as dictator, avenged the disaster of the Caudine Forks, and in fact hardly any period of the great Republican era is without its distinguished Lentulus. The conspiracy of Catiline failed through the Lentulus of the period (Publius C. Lentulus Sura), its leader, next to Catiline himself. He had run through his fortune like the rest of that dissipated clique, and had become as desperate as they in the hope of mending his fortunes. He remained in Rome to plot,

while the rest rushed to arms in their camp in Etruria. Cicero, when consul, had him strangled in prison on the discovery of the plot, B.C. 63. Two Lentuli—father and son—who bore the additional name of Spinther (Publius Cornelius Lentulus Spinther), were active on the aristocratic side in the great civil war which raised Caesar to the empire on the shoulders of the popular party; and the younger one served also with Brutus and with Cassius after Caesar's murder, B.C. 44. Another Lentulus (P. C. Lentulus Crus) was the chief accuser of Clodius in the Bona Dea case. He was among the bitterest enemies of Caesar, and that so openly as to be of service to his foe in affording, by his harsh measures and speeches, a justification for the famous crossing of the Rubicon by Caesar (B.C. 49) which marked the beginning of the civil war. The entrance of armed legions on foreign service into Italy was an act of rebellion, but Caesar could point to the provocations of Lentulus.

LEO (the Lion), a constellation of the zodiac which commemorates the Nemean lion killed by Hercules in the mythology of the Greeks. It is surrounded by Ursa Major, Leo Minor, Cancer, Hydra, Sextans, Virgo, and Coma Berenices. A line drawn through the pole star and the lowest of the four in the Great Bear (or γ) passes through Deneb (or β Leonis); and a line drawn through the bright star Regulus (or α Leonis), of the first magnitude, and Deneb passes nearly through Arcturus. The group of large stars in the front of Leo is often called, from its shape, the Sickle. See PLATE CONSTELLATIONS, Northern Hemisphere, X. -XI.

LEO I., surnamed the *Great*, Emperor of the East, was born about 400, in the country of the Bessi (Thrace), of obscure parentage. He entered the army, and at the death of the Emperor Marcianus, in 457, he held the office of military tribune and had become steward to Aspar, a powerful Gothic chief and commander of the guards. Aspar might have aspired to the throne but for his Arminson, and by his advice Leo was nominated to the vacant throne. The nomination was ratified by the senate, and Leo was crowned by the Patriarch Anatolius—the first example, it is said, of an emperor receiving the imperial crown from the hands of a prelate. Among the more prominent public events of his reign were his persecution of the Eutychians, in which he opposed the policy of Aspar, the defeat of the Huns in 466 and 468, and the equipment of an immense expedition against the Vandals in 468. Owing to the sapineness and mismanagement of the commander, Basiliscus, Leo's brother-in-law, the expedition was an utter failure; but public opinion fastened the blame upon Aspar, and Leo took advantage of this to treacherously put that chief and his sons to death on a charge of conspiracy. This was followed by a revolt of the Goths, which was only suppressed after they had committed great ravages and nearly overturned the government. Leo died in 474, and the succession devolved on the son of his daughter Ariadne, Leo II., who was only four years old, and who died two months afterwards. Leo gained the title *Great* from the support he gave the Trinitarian party. By his Arian subjects he was denuded as "the butcher."

LEO III., surnamed the *Isaurian*, from the place of his birth, was of humble origin, and was born about 680. By his valor and military skill he rose in the army until he obtained the supreme command of the troops in Asia. In 700 the Emperor Anastasius was deposed by Theodosius III., but Leo refused to acknowledge Theodosius and marched to Constantinople, being himself made emperor in 717. The next year he had to oppose the advance of the Arabs, who invested Constantinople by land and sea, and who were not defeated until 720. In 722 Leo promulgated a series of edicts, by which all Jews and Montanists were compelled to accept baptism, and in 726 he issued a further decree directed against image worship. The re-

sults of the latter edict were momentous, for not only did a series of insurrections break out in the empire, which were only suppressed with much bloodshed, but the Popes Gregory II. and Gregory III. joined issue with the emperor, and a permanent breach was created between the Eastern and Western Churches. The closing years of Leo's reign were disturbed by an indecisive war with the Arabs, and by an earthquake which in 740 devastated a great portion of the empire. He died in June, 741.

LEO is the name chosen by thirteen of the popes.

LEO I., a Roman, was only a deacon when he was chosen by the clergy and the people of Rome to be their bishop, after the death of Sixtus III., in 440, under the reigns of Valentinian III., emperor of the West, and Theodosius III., emperor of the East. Soon after his exaltation he had a controversy with Hilarius, bishop of Arles, who sought to keep the Gallic Church free from Roman authority, and obtained a rescript from the Emperor Valentinian III. suspending Hilarius from his episcopal office, and clearly setting forth the supremacy of Rome in the affairs of the church in Gaul. Leo took part, by his legates, in the famous "robber" synod of Ephesus, which met to consider the alleged heresy of Eutyches; and sent to it a very celebrated letter, containing an elaborate statement of his own views as to the twofold nature of Christ. The violence of the synod prevented this being read. Soon afterwards the oecumenical council of Chalcedon, in 451, condemned the doctrine of Eutyches, and accepted fully Leo's statement as the church doctrine concerning the person of Christ. Leo not only thus came to the front in church matters, he also assumed the leadership of Italy in very troublous times, meeting Attila and the Huns in 452 along the line of the Po, and persuading "the scourge of God" to turn back and leave the rest of Italy unwasted. In 455 he attempted a like enterprise with the Vandals under Genseric, but could obtain only the safety of a few churches; the rest of the city was given over to plunder. But at Leo's earnest pleading Genseric consented not to set fire to the city, and not to put the inhabitants to the sword. Leo died in 461, and was succeeded by Hilarius I. His writings, especially his sermons and his epistles, are useful for the history of the times. Quesnel has given a full account of his life (1700), but the standard edition is that of Ballesini (Venice, 1756), an improved version of Quesnel. The Roman Church numbers him among its saints, and gives him the epithet of Magnus, or "St. Leo the Great."

LEO II. (682-683), a Sicilian, is remarkable as having formally acquiesced in the condemnation of a pope for heresy. He wrote more than once in approval of the action of the Council of Constantinople, who had condemned one of his predecessors, the Pope Honorius I.

LEO III., a native of Rome, was elected pope on the death of Adrian I., in 795. The principal event of his pontificate arose out of an attempt made upon his life by a band of armed ruffians (for which the two chief conspirators, Paschal and Campulus, were exiled), and his consequent appeal to Charles the Great, king of the Franks, for protection. This involved an examination into certain charges brought against him by his enemies, but which they failed in establishing. Leo crowned Charles at Rome in 800, and Charles from that time styled himself Augustus and emperor of the Romans. Leo III. died in 816, and was succeeded by Stephen IV.

LEO IV. (847-855), a Roman, was the founder of the "Leonine City" round the Vatican, part of his energetic efforts to repair the disaster inflicted on the city by the Saracens in the preceding reign. In the course of the building a great fire broke out. Leo offered up prayer, and the cessation of the fire on the instant was held to be a miracle. Raffaele has made it the subject of one of his great frescoes in the Vatican (*Salvato dall' Incendio*).

LEO V. reigned one month in 903; LEO VI., seven months in 928; LEO VII., from 936 to 939.

LEO VIII. (963-965), a Roman, held a lay office at the Roman court when John XII. was deposed. The German emperor, Otto the Great, held him in high esteem, and at once called on him to assume the papacy. His unclerical post was not allowed to stand in the way: he passed through all the orders of the church in two days. When Otto retired from Rome in 964, John XII. returned, and met with so much support that Pope Leo had to flee for his life. Otto returned with an army and compelled the Romans again to receive Leo (John had died meanwhile); and in gratitude for this service Leo gave the emperor some great privilege over the church in Germany. Otto and his successors alleged that it was the right of investiture—that is, of appointment to church posts—which they had received, but the popes always held the document shown in proof of this claim to be a forgery.

LEO IX. (1049-54), an Alsatian (Bruno by name), a relative of the Emperor Conrad II. He gained much fame when bishop of Toul by his zeal in forwarding the missionary work of Cluny; and when at Worms he was unanimously elected pope to succeed Damasus II. by the council there assembled. He took with him to Rome, where he submitted to re-election, the most promising young monk of Cluny, Hildebrand. Leo's penetration was shown in the famous after-career of Hildebrand, who, after governing the church through several pontificates, himself became pope as Gregory VII. Leo's first act was to procure the injunction of the celibacy of the clergy; and in the several long progresses through Italy, France, and Germany for which his papacy is so remarkable, he never ceased to advocate this new dogma of the church. In 1053 he sought to restrain the Norman advances in the south at the head of an army, but he was taken prisoner and detained in honourable captivity at Benevento till a month before his death.

LEO X. (*Giovanni de' Medici*), the second son of Lorenzo the Magnificent, pope from 1513 to 1523, succeeding Julius II., was born in December, 1475. His education was superintended by Politian, and he acquired a great taste for literature and art. Through the influence of his father he was made cardinal at the unprecedentedly early age of thirteen; and after some reverses of fortune, owing to the downfall of his family, was elected pope in March, 1513. At his accession he found Northern Italy engaged in a war with France. The French were defeated at Novara, and driven from the country. But on the death of Louis XII. of France, in 1515, his successor, Francis I., among his other titles, assumed that of Duke of Milan, which proved the signal for a new Italian war. The Medici family was now re-established in Florence, and the political aims of the Pope were influenced accordingly. In 1515 Francis, by crushing the Pope's Swiss allies at Marignano, had not only Florence at his mercy, but the recently acquired papal duchies of Parma and Piacenza. The French took possession of Milan, and Leo came to terms. A concordat was agreed upon as to the French Church, which remained in force till the revolution of 1789.

In 1516 Leo, to replace Parma and Piacenza, under some frivolous pretences deprived Della Rovere, the nephew of Julius II., of his duchy of Urbino, which he gave to his own nephew Lorenzo de' Medici. Soon afterwards a conspiracy to murder the Pope was discovered at Rome, and Cardinal Petrucci, who was at the head of it, was hanged. Several other cardinals were imprisoned. To replace the vacancy in the Sacred College Leo created thirty-one cardinals in a single day—a fact unique in the history of the church. The unanimity thus secured in the papal councils led to fatal results. When Luther began the Reformation by his daring protest in 1517, there was no one to show the all-powerful and magnificent pope the real meaning of the

new revolt. By his wars, but far more by his splendid patronage of the arts, especially the building of St. Peter's, Leo had ruined the exchequer. The desperate sale of indulgences to get money at any price was the final stroke which brought down the anger of Luther. It should be added that on his election Leo had promised not to issue any brief for collecting money to build St. Peter's. Leo's amusement at the opening of the struggle soon deepened into anxiety, but political triumphs succeeded and diverted his attention, and he died without knowing the full danger of the church. In his fever of joy at the news of the restoration of Parma and Piacenza to the papal dominions, and the apparently almost certain elevation of the Medici to the throne of Milan, now freed from the French, the brilliant results of his alliance against France with the new emperor, Charles V., the Pope exposed himself to a dangerous chill, which caused the brief illness that so rapidly led to his death.

LEO XI. (*Alessandro de' Medici*), succeeded Clement VIII. in 1605. He reigned a few days only.

LEO XII. (*Annibale della Genga*), was pope from 1823 to 1829. He had become well known for the conduct of delicate missions. In 1790, when thirty years of age, he had the difficult task of pronouncing a funeral discourse over the Emperor Joseph; in 1808 he had to encounter the Emperor Napoleon; in 1811 it was he who welcomed Louis XVIII. to France on the part of the Pope, and for his reward he was made cardinal (1816). He was chosen successor to Pius VII. in 1823, though his life apparently hung on a thread. After his elevation he regained strength, and continued as pope that skill in steering through difficult passes which had won him his earlier recognition. He died 10th February, 1829, and was succeeded by Pius VIII.

LEO XIII. (*Vincenzo Gioacchino Pecci*), who ranks as the 258th Roman pontiff, succeeded Pius IX. (*Pio Nono*) as pope, 20th February, 1878. He was then almost sixty-eight years of age, being born in March, 1810, at Carpineto, Anagni. His father, Count Ludovico Pecci, sent him as a lad to the Jesuit College at Viterbo, and in 1824 to the great Jesuit College at Rome, the Collegio Romano. Here he won a student's reputation in physical and mathematical subjects, and later on in philosophy; assisting also in the tutorial work of the college. On leaving the Collegio Romano the young abbate attended the Roman university, studying canon and civil law, and again made himself remarkable by his talent. Cardinal Antonio Sala brought him to the notice of Gregory XVI. upon his taking his degree as Doctor of Laws, and he at once entered into the service of the Vatican, as Referendary of the Segnatura. He was made priest in 1837, and was promoted to be prothonotary apostolic, and delegate at Benevento, Perugia, and Spoleto in succession. In these important posts he ruled with great prudence, and was especially successful in suppressing brigandage. In 1843 he was sent as nuncio to Belgium, being created at the same time archbishop of Damietta *in partibus*. He became bishop of Perugia in 1846, and cardinal (under Pius IX.) in 1853. He was very active in the various congregations of the cardinals, and in 1877 was nominated Cardinal Camerlengo, a very important dignity. When Pius IX. died, 7th February, 1878, the government of the whole church passed to Cardinal Pecci in virtue of his office, until the election of the new pope; and it was also part of his duty to conduct that election. His own name steadily grew in favour at each voting of the cardinals, and after two days only (18th to 20th February), the conclave arrived at the end of their task, declaring by forty-four out of sixty-two votes in his favour. He was crowned in the Sistine Chapel 3rd March, 1878.

LEOMINSTER, a municipal borough of England in the county and 13 miles north of Hereford, and 157 from London by the Great Western Railway. The High Street

of the town is spacious. Many of the other streets were formerly narrow and inconvenient, but are now generally very much improved. Many brick houses have also been built, and there are now very few of the old timber dwellings remaining. The parish church is of considerable antiquity, but it was thoroughly restored in 1866 and enlarged in 1879. There is another church and several places of worship for dissenters. The inhabitants manufacture leather, gloves, hats, agricultural implements, and iron and brass goods, printers' ink, lampblack, charcoal, and bricks; and the town has a good trade in cattle, hops, wheat, wool, and cider. The country around is the most celebrated cattle-breeding district in the world—nearly the whole of the prize "Herefords" being reared there. The town contains a market-house, town-hall and corn exchange, and a free grammar-school. The municipal borough is governed by four aldermen and twelve councillors. The population in 1881 was 6042. Until 1868 the borough had two representatives in the House of Commons, and one from that time to 1885. The town is said to have originated in a monastery founded by Merwald, king of Mercia, and was already a place of some importance at the Norman Conquest. It sent members to Parliament since the reign of Edward I., and received its charter of incorporation from Queen Mary for supporting her cause against Lady Jane Grey. A few miles from Leominster a modern column indicates the site of the battle of Mortimer's Cross, fought during the Wars of the Roses, which raised the Yorkist leader to the throne with the title of Edward IV.

LEON, the name of a kingdom in Spain, which grew out of the conquests of the Christians from the Moors. It was anciently inhabited by the *Vettones* and *Callaici*, and formed a part of the Roman *Tarraconensis*. Don Pelayo and his successors during the eighth century formed this district into a kingdom, called after its capital, and connected with that of Asturias. The immediate successors of Pelayo were kings of Asturias, and resided at Oviedo. Alfonso the Catholic, from 739 to 757, conquered the towns of Leon, Astorga, Simancas, Zamora, Salamanca, and Ledesma, as well as part of Galicia, all of which were added to the dominions of the Asturian kings. Garcia, son and successor of Alfonso III., about 910 transferred the seat of sovereignty from Oviedo to Leon. Henceforth the Christian kingdom in Northern Spain was called the Kingdom of Leon and Asturias. The male line of the kings of Leon became extinct with Bermudo III. in the year 1037. His sister had married Fernando, king of Castile, who thus united both crowns. But upon Fernando's death, Sancho, one of his sons, had Castile, and Alfonso had Leon and Asturias. The two kingdoms remained distinct, although their crowns were sometimes worn by the same person, for nearly two centuries, until Fernando III., in 1230, permanently united them, assuming the title of King of Leon and Castilla, which his successors retained.

The territory of the kingdom of Leon is comprised in the basin of the Douro, between the Asturian Mountains on the north, the Sierra de Gata and Sierra de Gredos on the south, which divide the basin of the Douro from that of the Tagus. Old Castile on the east, and Portugal and Galicia on the west.

LEON, THE PROVINCE OF, is bounded N. by Oviedo, S. by Zamora and Valladolid, E. by Palencia, and W. by Orense and Lugo. It is 130 miles in length from east to west, and about 50 wide from north to south. The area is 6166 square miles, and the population at the last census was 350,210. The province belongs mainly to the basin of the Douro, being crossed from north to south by the Esla, which rises in the mountains of Valdebaron, on the borders of Asturias, and flows southwards into the province of Zamora, where it enters the Douro. There is a small part of the province of Leon, west of Astorga, which belongs to the basin of the Miño, being watered by the Sil,

a tributary of that river. The surface of Leon is mountainous in the north of the province, where it rises towards the Asturian chain, but it slopes to the south, where it sinks into the plain of the Douro. The country produces corn, fruit, vegetables, hemp, flax, and wine. Large herds of cattle and flocks of sheep, as well as horses and mules, are reared in this province. The inhabitants are for the most part uneducated and lazy, agriculture is in a very backward state, and everywhere the means of communication are defective. The manufactures are unimportant.

LEON, the capital, an old and somewhat decayed city, is said to have been built by the Roman soldiers of the seventh legion, in the time of Vespasian; it was for more than two centuries the residence of the kings of Christian Spain. Its cathedral, built in the thirteenth century, is one of the finest in Spain, and contains the tombs of the old kings. There are two collegiate churches, San Marco and San Ysidro, twelve other churches, and four hospitals. The Plaza Mayor, or principal square, is handsome, and there are other squares adorned with fountains. Leon contains 10,000 inhabitants. It is 17½ miles W.N.W. of Madrid, on the railway to Corunna. Linen weaving, stocking knitting, and glove making are the principal branches of industry.

LEONARD'S, ST. See **HASTINGS**.

LEONIDAS, King of Sparta, commanded the Grecian troops sent to maintain the Pass of Thermopylae against the invading army of the Persians under Xerxes, B.C. 480. The force under his command amounted to 4200 men, besides the Opuntian Lokrians and 1000 Phokians. With these, during two days' fight, he defended the narrow defile which was the usual passage from Thessaly to the southern parts of Greece. But some renegades discovered a circuitous and unfrequented pass, by which a body of the invaders crossed Mount Eta. On receiving intelligence that his position was thus turned, Leonidas dismissed all his soldiers except 300 Spartans, the Thebans, whose fidelity to the common cause was suspected, and the Thespians, 700 in number, who resolved to share the fate and the glory of the Spartans—for the laws of Sparta forbade her citizens to turn their backs upon any odds. Being surrounded and attacked in front and rear, the Spartans and Thebans fell to a man after making vast slaughter: the Thebans asked and received quarter. The corpse of Leonidas was mutilated, and exposed on a cross by Xerxes. A stone lion was afterwards raised on the spot where he fell. The slain were buried where they fell, and their memory was honoured by monumental pillars. Two of the inscriptions ran thus:—"Here four thousand men from Peloponnesus once fought three millions." "Stranger, tell the Lacedæmonians that we lie here, obeying their laws."

This is the account of Herodotus (vii. 202, &c.) Diodorus and Plutarch tell the story somewhat differently.

LEONINE VERSES, a kind of measure much in fashion during the middle ages, which rhymed at the middle and end. It consists properly of the Latin hexameter, or hexameter and pentameter rhymed. The most common structure of the verse is that in which the caesura on the fifth syllable rhymes with the end of the line: as,

"En Rex Edvardus, debacchans ut Leopardus."

There is an example of a modern attempt at Leonine verses in Parnell's translation of a passage in the "Rape of the Lock," beginning,

"Et nunc dilectum speculum pro more refectionum."

The classical metre is not essential. We find in the ancient hymns of the Roman Catholic Church the rhythm of modern versification, and in the famous song of Walter de Maupais, archdeacon of Oxford in the time of Henry II.:—

"Mihl est propositum in taberna mori,
Vinum silt appositum morientis ori,
Ut deant, cum venerint Angelorum chori,
Deus silt propitius huic potatori."

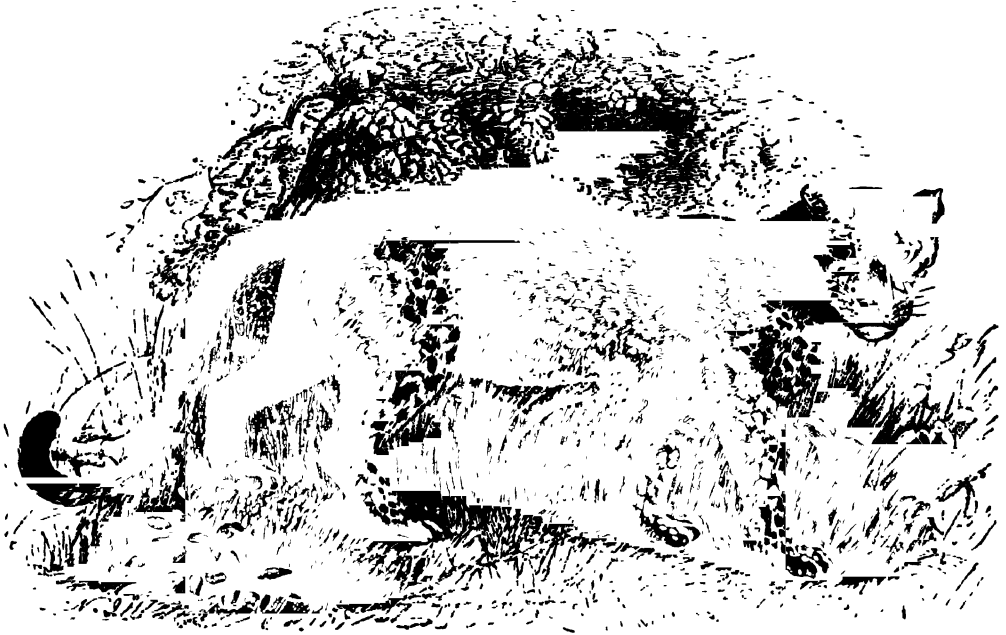
Leonine vases were so named after Leoninus, a canon of the Church of St. Victor, in Paris, about the middle of the twelfth century; or, as others say, after Pope Leo II, who was a lover and improver of music.

LEOPARD (*Felis pardus*) is one of the largest and best known of the cats (FELIDÆ). The history of the name borne by this species is curious. By the ancients it was called indifferently pard (Gr. *pardos* and *pardalis*), and panther (Gr. *panthēr*). The name leopard (lion-pard) seems to have been originally applied to the CHEETAH (*Felis jubata*), and later was transferred wholly to *Felis pardus*. The name pard, which was used almost exclusively by the Elizabethan writers, has now become altogether obsolete. Panther is now used vaguely for any large spotted cat, or for some of the varieties of *Felis pardus*, or lastly, in its proper sense, as synonymous with leopard.

The leopard enjoys a very wide geographical range. It is found throughout the greater part of Africa, extending from Algeria in the north to Cape Colony in the south. In Asia its range is wider than that of the lion, being

found throughout the southern portion of that continent, from Palestine to China and Japan, extending into Ceylon, Java, Sumatra, and Borneo. In different localities it varies extremely in size, form, and colour; but the best authorities agree that these varieties constitute only one species.

The leopard is smaller than the lion or the tiger. The male in Africa measures about 7 feet 6 inches from the snout to the tip of the tail, which latter appendage measures 3 feet 8 inches; it stands 2 feet 7 inches high at the shoulder. The female is somewhat smaller. The ground colour of the fur is of a pale yellow tint, passing into white below. The surface is marked at tolerably regular intervals by dark patches made up of numerous small round spots, blended together in the form of annulations surrounding a central clear space, the general tint within being deeper than the ground colour without. On the head and legs the circles pass gradually into mere spots. On the back and sides the circular patches are disposed in bands. Examples are sometimes met with in specimens from Asia of black leopards; in these the characteristic markings are present and visible, but the



Leopard (*Felis pardus*).

whole fur seems to have got a coating of black paint. This black colour is only an individual variation, as it sometimes happens that one cub only in a litter is thus coloured.

The leopard is an expert climber of trees. It preys largely on deer and other similar herbivorous mammals, and has a special liking for the flesh of the dog. In India it has been known to attack women and children, and at times even men. It is frequently captured by the natives of the countries which it inhabits in traps and pitfalls. Like the other Felidæ its flesh is valueless as food; the skin, however, is valuable.

In Pleistocene times the leopard ranged through Europe and England. The CHEETAH (*Felis jubata*) is often known as the Hunting Leopard; and the OUNCE (*Felis uncia*) as the Snow Leopard.

LEOPARD'S BANE. See ARNICA.

LEOPOLD I. Emperor of Germany, of the house of Austria, son of Ferdinand III. and of Mary Anne of Spain,

born in 1610, was proclaimed king of Hungary in 1655, king of Bohemia in 1657, and emperor of Germany in 1659. The Turks, who were then overrunning Hungary, were joined by a large portion of the Hungarians under Emeric Tekeli, and gained several victories over the emperor. Louis XIV., who had encouraged the Turks in their invasion, now formed a plot, by means of his diplomatic agent at Cracow, to dethrone Sobieski, who had promised to assist Leopold. The plot, however, was discovered by means of an intercepted letter written by the French ambassador. Sobieski laid the matter before the Polish diet, expressing at the same time his conviction, whether real or politically assumed, that the whole was a fabrication. "But," added he, "let us convince the world also that it is an imposture; let us declare war against the infidels." The declaration was voted almost unanimously. On 11th September, 1683, the allied army reached the summit of the Calenberg, which commanded a view of the Austrian capital, then invested by the Turks.

On the 12th the battle was fought, the Turks were defeated, and Vienna and perhaps all eastern Europe were saved.

At the diet of Pressburg of 1687 the crown of Hungary was declared to be no longer elective, but hereditary in the Austrian male line. Transylvania likewise submitted to Leopold. The Turkish war was at length concluded by a great victory gained by Prince Eugène, in September, 1697, near Zenta in Hungary, which was followed by the peace of Carlowitz.

Leopold sustained three wars commenced by Louis XIV. The first was ended by the treaty of Nimègue in 1679, and the second by the peace of Ryswick, in 1697. The third was that of the Spanish Succession, to which Leopold's son, the Archduke Charles, had undoubted claims. Leopold, however, did not live to see the termination of it; he died in 1705.

The principal internal events in Germany during the reign of Leopold were—(1) The establishment of a ninth electorate in favour of Ernest Augustus, duke of Brunswick Lüneburg, who in 1692 became the first Elector of Hanover; (2) the assumption of the regal title by Frederick, elector of Brandenburg and duke of Prussia, in 1701; (3) the establishment of a permanent Diet, attended, not by the electors in person, but by their representatives. Leopold's private character was estimable, and his disposition was good and well-meaning, but he was weak, irresolute, and inclined to bigotry. He was succeeded by his eldest son, Joseph I.

LEOPOLD II. of Germany, and I. of Tuscany, was the second son of Maria Theresa of Austria and Francis of Lorraine. He succeeded to the grand-duchy of Tuscany in 1765, and fixed his residence at Florence. During the five-and-twenty years of his administration he greatly improved the condition of Tuscany. By his own absolute act, in 1786, he promulgated a new criminal code, abolished torture and the punishment of death, and established penitentiaries to reclaim offenders. He finally abolished the Inquisition in Tuscany in July, 1782, and placed the monks and nuns of his dominions under the jurisdiction of the respective bishops. This he effected through the agency of Ricci, bishop of Pistoia. A curious controversy followed with the court of Rome. In his civil administration Leopold effected many important reforms.

At the death of his brother Joseph II., 20th February, 1790, Leopold succeeded to his dominions, and was elected emperor of Germany, while his son Ferdinand succeeded him as grand-duke of Tuscany. On assuming the administration of the hereditary dominions of the house of Austria, Leopold showed an earnest desire to please his subjects, and he succeeded; he abolished the more obnoxious innovations of his brother; he concluded a peace with the Porte; he pacified Hungary; and having done this, his next step was to endeavour to pacify the revolted states of the Netherlands, by offering to re-establish their ancient constitutions. The insurgents having obstinately refused to listen to his offers, he sent troops against them, and recovered without much difficulty those fine provinces. Then came anxieties concerning the fate of his sister Marie Antoinette, queen of France, and her husband; the convention of Reichenbach, and that of Pilnitz, in August, 1791, between Austria and Prussia, for the purpose of checking the progress of French revolutionary proselytism. In the midst of all these cares Leopold died, 1st March, 1792, aged forty-four. He was succeeded by his eldest son, Francis II.

LEOPOLD I., GEORGE CHRISTIAN FREDERICK, King of the Belgians, was born on 16th December, 1790. He was the youngest son of Duke Francis of Saxe-Coburg, and brother of Duke Ernest, and also of the Duchess of Kent. He was consequently uncle both of the Prince Consort and Queen Victoria. He was most carefully educated, and had the reputation of being one of the best informed princes of Europe. His sister having married the Grand-duke Constantine, he entered the Russian military

service with the rank of general, and in that capacity accompanied the Emperor Alexander to Erfurt. The menaces of Napoleon forced him to resign his commission for a time, but he afterwards re-entered the service, and distinguished himself at the battles of Lützen, Bautzen, Leipzig, and Culm. He visited London in 1815, and out-rivalled the Prince of Orange as suitor for the Princess Charlotte, daughter of George IV., and heiress to the throne. A settlement of £50,000 per annum was made upon him, and he was naturalized and created Duke of Kendal and a field-marshal. The marriage was celebrated on the 2nd of May, 1816, and on the 5th of November in the following year the princess died in childbirth. For many years after this melancholy event Prince Leopold lived a very quiet and retired life, residing principally at London and Claremont.

In 1830 he was offered the crown of Greece, but declined it in consequence of the dissatisfaction which the Greeks felt at the arrangements which had been made on their behalf by the three great powers—England, France, and Russia. About this time Belgium threw off the yoke of Holland, and in June, 1831, he was elected king of that country by a national congress. In 1832 he married Louise, the daughter of Louis Philippe, king of the French, and thus secured an alliance with his most powerful neighbour; but it was not until 1838 that the differences between Holland and Belgium, as to certain territories, were finally and amicably settled. The treaty of separation was signed 19th April, 1839. For many years it required all his majesty's great ability to deal with the internal affairs of his kingdom, more especially with the "religious difficulty," he being himself the Protestant sovereign of a Catholic country; but whatever his private feelings might have been, Leopold always acted as a thoroughly constitutional king, and endeavoured to govern according to the wishes of the parliamentary majority, of whatever political or religious sect. His queen died in 1850. She had borne him three children; Leopold II., the present king, and another son and a daughter. His death took place at his palace of Laeken, 10th December, 1865. During his reign he effected much for the internal prosperity of his kingdom, especially in the establishment of an extensive system of railways and a national bank. His commercial policy with foreign countries was also exceedingly liberal; and in fact he always conducted himself with prudence, firmness, and moderation, with continual regard to the principles of the Belgian constitution, and with an evident desire to do everything in his power to promote the welfare and happiness of his people, by whom he was very much beloved.

LEOPOLDINIA is a genus of Palms, which are natives of Northern Brazil. There are four species, trees of moderate size, without spines, and crowned with finely-cut feather-shaped leaves. The flowers are minute, unisexual, of a reddish colour. The female flower has a three-celled ovary, with small eccentric stigmas. The fruit is yellowish-green, roundish, containing a single seed. The bristles, which are used by brush-makers for the manufacture of street brooms, are made chiefly from *Leopoldinia* *lissaba*, but also from a species of *ATTALEA*. The trunk of the Jara Palm (*Leopoldinia pulchra*) is used for fences, as it is smooth and of convenient length. Wallace, in his account of this palm, speaks of the irregularity of these fences as characteristic of the want of neatness of the natives. "The bright green and glossy foliage also renders this tree suitable for another purpose. On certain saints' days little altars and green avenues are made before the principal houses in Barra, the Jara palm being always used to construct them; and its graceful leaves, rustling in the evening breeze, fitfully reflecting the light of the wax tapers which burn before the images of the saints, with the blazing torches of the rustic procession, produce a very pleasing effect."

LEPANTO, GULF OF, the ancient *Corinthian Gulf*, is a narrow sea above 70 miles in length from west to east, extending between the northern coast of the Peloponnesus and the mainland of Greece. It is entered from the Gulf of Patras on the western side by the Strait of Lepanto, not quite 2 miles wide, which is defended by two castles. A few miles inside of the strait, on the northern coast, is the town of Lepanto, the ancient *Naupactos*, a name now coming into modern use, built on a hill, and commanded by a castle, with a good harbour and between 2000 and 3000 inhabitants. The gulf widens towards the middle to the breadth of 12 or 13 miles, exclusive of several deep bays which indent its northern coast, especially the Bay of Salona, the ancient *Crisæan Gulf*, which stretches about 8 miles to the north. The eastern extremity of the Gulf of Lepanto terminates in two bays; that of Corinth to the south-east, where the Lechaean or western harbour of Corinth once was; and the other, which extends to the north-east, bordering on the territory of Mégaris and stretching to the foot of Mount Cithæron. This last bay is now called Livadostro.

Lepanto has given its name to a celebrated naval battle fought on the 7th October, 1571, in which the Christian allied fleet, amounting to 210 ships in all, commanded by John of Austria, utterly defeated the Turkish fleet of 300 sail under Ali Pasha, who lost his life in the engagement. Cervantes fought in this battle, and received a wound which deprived him of the use of his left hand for the rest of his life. The battle of Lepanto is called by some Italian writers the battle of Curzolari, from the group of islets so called at the mouth of the Achelous, where the battle commenced.

LEPER. See LEPROSY.

LEPIDINE, a volatile organic base obtained from the distillation of quinine with solution of potash. It is an oily base homologous with chinoline, of specific gravity 1.072, and boiling at 270° C. (518° Fahr.) The formula is $C_{10}H_9N$. It is strongly alkaline, and forms many crystalline salts and several derivatives.

LEPIDODENDRON, an important genus of fossil plants. M. Brongniart referred the *Lepidodendra* to the natural group of *LYCOPODIACEÆ*, pointing out, however, their analogies to *Cycadææ* and *Coniferæ*.

Lindley concluded that *Lepidodendron* "was not exactly like either *Coniferæ* or *Lycopodiaceæ*, but that it occupied an intermediate station between these two orders, approaching more nearly to the latter than the former." It is now acknowledged by all that this genus of tree-like plants belongs undoubtedly to the club-mosses (*Lycopodiaceæ*), which at the present day are of small dimensions. These fossils appear first in the Silurian period; they occur in larger numbers in the Devonian rocks, and attain their greatest development in the coal-measures of the Carboniferous period. The trunk frequently occurs with a length of 50 feet and more, giving off branches in a forked manner. The outer surface is marked with the scars of the fallen leaves, which were short, narrow, sharp-pointed, and densely crowded. The scars are oval-shaped and arranged in spiral order. According to Williamson, each twig in the very young state has a central bundle of scalariform vessels, which branches off by smaller bundles into the leaves. Surrounding the central bundle there are three layers of cells, the inner and outer of which are parenchymatous, and the middle one somewhat prosenchymatous. As the twig grows older a central pith of parenchymatous cells is formed within the bundle of vessels. At a still later date new vessels are formed, arranged in vertical radiating plates, but the leaf-bundles pass through these, coming only from the original bundle. The roots are known as *Stigmaria*. They have a central pith and bundles of vessels arranged in a radiating manner, from which smaller bundles pass off to the rootlets. The structure of the cone (*Lepidostrobus*) is the same as that

of *Selaginella*, consisting of bracts supporting in the axis sporangia, the large spores being borne in the lower part, and the small spores in the upper part of the cone. Myriads of the large spores are found in many coals. The species are numerous, and confined to the older strata, and specially abundant in the coal formation. See COAL.

LEPIDOLITE (Gr. *lepis*, a scale, and *lithos*, a stone) or Lithia Mica, a rhombic mica allied to muscovite, in which part of the potash is replaced by lithia. It occurs in small scales and granules in certain rocks, and has usually a rose-red, lilac, or violet-gray colour. It is an important source of the rare alkali lithia, and often contains besides rubidia and cæsia.

LEPIDOMELANE is one of the hexagonal micas, and is closely allied to Biotite. It occurs in Cornish and Irish granites.

LEPIDOPTERA is one of the orders into which INSECTS are divided. This order is composed of those insects which are commonly called butterflies and moths, and which possess four wings, usually of large size, and covered with a multitude of minute scales, which to the naked eye appear like powder. The nervures of the wings are not very numerous, and are disposed chiefly in a longitudinal direction; a small scale is situated on each side of the thorax at the base of the wings, which appendages are called *perygoda*. The antennæ are almost always distinct, and are composed of numerous minute joints. The parts of the mouth are formed into a proboscis fitted for extracting the nectar from flowers, or conveying other juices to the oesophagus. This proboscis, when not in use, lies spirally folded beneath the head and between two palpi covered with hair, which are usually directed forwards and upwards, and which represent the labial palpi. The proboscis is composed of two sub-cylindrical tubes, formed by the elongated maxillæ; these tubes vary greatly in length in the different species of lepidopterous insects, and between them there is an intermediate one, formed by their junction, which is deflected by means of a series of hooks imbricating one with another like the laminae of a feather. It is through this central tube that the juices are conveyed, the lateral tubes being intended, as it is supposed, for the reception of air. At the base of the proboscis or "tongue" are the minute rudimentary maxillary palpi. The mandibles and labrum in these insects are reduced to mere rudiments. The head, thorax, and abdomen are always more or less covered with hair; the former, besides the ordinary compound eyes, is sometimes furnished with simple eyes or ocelli; these, however, are generally hidden by the hair of the head, and do not exist in the diurnal lepidoptera. The legs are slender, cylindrical, and weak. As the *Lepidoptera* are essentially flying insects and scarcely use the legs, the fore pair has become rudimentary in some butterflies.

The *Lepidoptera* undergo a complete metamorphosis. The larvæ are active, having a cylindrical worm-like form, a biting mouth, six thoracic legs, and from one to five pairs of abdominal prolegs. The food of the larvæ almost always consists of vegetable substances, generally the leaves of plants. Some live in rotten or rather dead wood, upon which they feed; others feed upon animal substances, and are very destructive to furs, woollen goods, and feathers. In many cases the larvæ, before passing into the pupal state, spin cocoons of silk, or silk mixed with other substances, such as bits of wood or their own hairs. The spinneret is a modification of the larval lip. The pupæ, or chrysalides, are incapable of eating or locomotion, and are termed obteected; they usually approach somewhat to an oval form, but are pointed more or less at the posterior extremity. The shape of the pupæ, however, varies much according to the species; and those of butterflies often present numerous angular projections, and sometimes exhibit brilliant metallic colours. The

parts of the perfect insect, such as the head, thorax, segments of the abdomen, wings, and legs, can be distinctly traced.

The Lepidoptera are almost entirely terrestrial. No parasites occur in this order. In the tropics MIMICRY occurs remarkably among butterflies. Dimorphism, and even polymorphism, seems to be not uncommon. Butterflies and moths are found in all parts of the world, and both are very rich in species. Remains, doubtfully referred to the Lepidoptera, have been found in the Jurassic rocks.

The order Lepidoptera is divided into two groups of suborders, Rhopalocera (BUTTERFLIES), and Heterocera (MOTHS). The butterflies are distinguished readily by the form of their antennæ, which terminate in a club or knob, while in the moths the antennæ vary in character, being thread-like, or feathery, or thickened in the middle. Another distinction of less value is that while the butterflies fly only in the sunshine the moths are frequently nocturnal.

LEPIDOSIREN is a genus of fishes belonging to the *Dipnoi*. Only one species is known, *Lepidosiren paradoxa*, from the river Amazons in South America. It was first discovered by Dr. Natterer in 1837. A few specimens have been brought to Europe, but it has not been met with for some time. *Lepidosiren* has an eel-shaped body covered with cycloid scales. A continuous vertical fin extends along the hinder part of the back and runs round the tail as far as the vent. There are two pairs of long ribbon-like fins, each of which is supported internally by a jointed cartilaginous rod. In the upper jaw on each side is a dental plate divided into three cutting lobes, and in the lower jaw two similar plates. A pair of conical pointed teeth are also present on the vomer. There are five branchial arches with four intervening gill-slits, but no external gills. In addition, the air-bladder is divided completely into two halves, and resembles most nearly the cellular lung of a reptile, being supplied with venous blood by a true pulmonary artery.

The larger of the two lepidosirens obtained by Natterer was nearly 4 feet in length. It is said to feed on vegetable substances. When the waters in which it lives dry up, it is said to plunge beneath the mud and lie dormant for a considerable period.

The African *Lepidosiren* (*Protopterus annectens*), usually called *Lepidosiren* in zoological collections, is spread over tropical Africa. It is frequently brought alive to this country in little balls of clay, which have been dug out of the dried stream in which it spends the dry season. For details of its anatomy, see *PROTOPTERUS*.

LEPIDUS, MARCUS EMILIUS, the Roman triumvir, was elected ædile of Rome *n.c.* 52, and prætor *n.c.* 49, in which year Cæsar came to an open rupture with the senatorial or aristocratic party. From his entrance into public life he opposed the aristocratic party; and his great riches and family connections made him an important accession to the popular cause. On the first expedition of Cæsar into Spain, Lepidus was left in charge of the city. During Cæsar's absence, Lepidus proposed the law by which that great general was created Dictator, for the flight of the consuls with Pompey had left Lepidus the chief officer of the republic in Italy. In 48 *n.c.* he received Spain as his province, had a triumph in 47, and served as Cæsar's colleague in the consulship in 46. He received Gaul as his province in 44, and had not started when Cæsar was murdered. His army was of great use to Antony, who in his gratitude allowed Lepidus to become *pontifex maximus*.

After the death of Cæsar Lepidus was counted by both rival parties; but, when ordered by the senate to join Decimus Brutus, instead of obeying he united his forces with those of Mark Antony.

In the autumn of this year, *n.c.* 43, the celebrated triumvirate was established between Antony, Lepidus, and

Octavian (Augustus); and in the division of the provinces, Lepidus received Spain and Gallia Narbonensis. The charge of the city was intrusted to Lepidus, who was again elected consul (*n.c.* 43). After the defeat of Brutus and Cassius, Spain and Gallia Narbonensis were taken from Lepidus, and Africa given to him instead. Lepidus had now lost authority; but he was again included in the triumvirate when it was renewed *n.c.* 37. In the following year he was summoned from Africa to assist Augustus in Sicily against Sextus Pompey, and he landed with an army, by means of which he endeavoured to regain his lost power. But being deserted by his own troops, he was obliged to implore the mercy of Augustus, who spared his life, and allowed him to retain his private property and the dignity of *pontifex maximus*, though he banished him to Circæii. Though Lepidus was certainly not the equal of Mark Antony and Octavian, he was a man of great ability. A certain indolence prevented him from using his advantages to the full.

There were many other distinguished Romans of this family, which was one of the chief families of the great Æmilian clan or *gens*.

LEPORIDÆ is a family of *RODENTIA* containing the HARE and the RABBIT.

LEPRA or **PSORIASIS**, the name of a non-contagious scaly disease of the skin. It generally commences in the form of small white spots about the size of a split pea, and these gradually increase in size and run together until patches are formed which are covered with thick white scales having a shining surface. These may occur in any part of the body, though the elbows and knees are the parts generally attacked. It sometimes occurs on the head, but seldom appears on the face. The patches caused by the disease give rise to itching and stiffness, but the general health is very little affected, and where the spots are covered by the clothes, so as not to be observed, the complaint causes comparatively little inconvenience. It is generally a very obstinate disease, and will last for months and years, the patient seeming to get better for a while, and then to suffer from a fresh eruption. It seems to be a constitutional disease and is sometimes hereditary, but it is not contagious in any way. The treatment of this complaint must be both general and local. The medicine which has the highest reputation as an internal remedy is arsenic, which may be administered in small doses three times a day after meals. Tar in the form of pills is sometimes given with an excellent result, and some doctors recommend that the patches should be painted with common liquid tar, which should be left on till it wears off. Among local applications, tar ointment diluted with twice its weight of lard, an ointment composed of two drachms of oil of cade to an ounce of lard, oxide-of-zinc ointment, and iodide-of-sulphur ointment are all recommended, while the more powerful agent of chrysophanic acid mingled with lard has been used with much success in the treatment of obstinate cases. In Germany the disease is treated by means of very prolonged tepid baths. In Old English works this complaint is referred to under the name of *lefter*.

LEPROSY (synon. *Lepra Arabum*, *Elephantiasis Græcorum*), the name of a disease which has existed from time immemorial, and which still afflicts a large portion of the human race. Its history can be traced in written records from the period about 1500 years *n.c.* to the present day, and through all this time its symptoms seem to have remained substantially the same. By the ancients, Egypt was regarded as the country from which the disease originated, and it was probably endemic among the Hebrews when they moved out of Goshen into the desert. Manetho asserts that the Egyptians drove out the Israelites because they were so tainted with this disease, and though the records of the latter people give a totally different account to

this, we can see from their history and the regulations of the Levitical law that it must have been very prevalent at the time of the sojourn in the wilderness. By the earliest Greek and Latin writers leprosy is spoken of as a foreign disease, but it had become established in Greece and Italy in the first century B.C., and by the Romans it was carried into different parts of Europe. Laws relating to it were passed in some of the countries of Europe as early as the seventh century, and leper houses were established at Verdun, Metz, and Maestricht at the same period. During the period of the Crusades leprosy became epidemic in the countries of Western Europe, and leper houses were founded in every considerable town. It is not known when it first reached Great Britain, but it seems to have been known as early as the fifth century, and at one time there were ninety-five leper houses of the first class in England, together with several in Ireland and Scotland. The disease began to decline in the fifteenth century, and had become very rare in the seventeenth, though it lingered on in Scotland to a much later period, and it was not until 1798 that the last known leper died there in Shetland.

At the present day it is unknown as a native disease in Great Britain, but in Europe it is still found in Norway, where there is one leper to each 833 persons, in Sweden, Iceland, and in some districts of Russia, Sicily, Spain, and Portugal. It is common all over the East from Syria to Japan, it prevails more or less throughout the greater part of Africa, and it is very common in some parts of South America, the West Indies, and Hawaiian Islands. By the Chinese immigrants the disease has been brought into the Australian colonies and the United States, but it is confined at present almost entirely to the Chinese.

Leprosy is a constitutional disease, and its first stages are so slight in their character as to be hardly noticed as a disease. Recurring periods of debility and weakness, with intervals of apparent health, are the first symptoms, and these sometimes extend over a long period without the manifestation of any further sign. Then spots and blotches appear upon the skin of the trunk and limbs, while the skin of the face, hands, and feet displays a uniformly diffused redness. The spots, which have appeared, grow in size and develop into rings of a dark colour with a white centre, and ultimately this gives way to a white blotch, which forms the characteristic mark of leprosy. In some cases these blotches have a moist appearance, while in others they are dry and rough. The skin of the affected parts is generally numb, and very little pain is felt during the earlier stages of the disease. In its later stages leprosy assumes a variety of forms, to which special names have been given. Where, as in the majority of cases, the manifestations chiefly occur in the skin and mucous membrane, it is known as *elephantiasis tuberosa*. In this form of the disease hard lumps appear raised above the surface of the skin, at first very small in size, but afterwards growing to the size of hazel nuts or even walnuts. They may occur at any portion of the body, but the parts most affected are the brows, eyelids, nose, lips, and ears. From exposure these nodules tend to ulcerate, and they discharge freely. By the spread of the disease the sight becomes involved, the throat swollen and painful, and the feet and hands greatly deformed. In another form of the disease, known as *elephantiasis anæsthetica*, the nervous system is more deeply implicated, and while there is an absence of tubercles and ulceration, the skin loses its power of sensation, and severe internal neuralgic pains are experienced. There is also great depression and desire for solitude, with much weakness and sense of exhaustion. In *elephantiasis mutilans* the local symptoms are chiefly displayed in the limbs, and the hands and feet, or even the arms from below the elbow, and the legs from below the knee, may be destroyed and lost. This terrible mutilation may take place almost without pain, and sometimes after

the loss of a portion of the body the stump heals kindly and a spontaneous cure occurs.

With respect to the causes of this disease very little is known. It certainly seems to be hereditary, but the latest opinion is that it is not contagious, a view of the subject which seems somewhat strange when compared with the history of the spread of the disease. Many considerations, however, have been advanced in support of the theory that leprosy is not infectious, and no distinct evidence can be given on the other side. Its origin has been by many writers attributed to the use of a fish diet, especially when the fish is eaten in a semi-putrid state; while others ascribe it to miasma, and regard it as arising from certain exhalations from the soil. It is most common among the poor wherever it is found, and probably the lowering of the system induced by exposure to cold and damp, with a meagre diet and inattention to cleanliness, if they do not cause, yet tend to spread the disease. With respect to the treatment of leprosy there is very little to be said, inasmuch as no means of cure have up to the present been discovered. Many remedies have been tried and many different systems of treatment adopted, but in nearly every case they have proved to be of very little efficacy, and leprosy must be regarded not only as an incurable, but a fatal disease. It is slow in its progress, and the duration of life, after it has manifested itself, may extend from ten to twenty years. In connection with this it may be mentioned that in the Levitical law of the Jews many forms of skin disease are included under the term leprosy, some of which were evidently merely temporary affections. The general nature of the term is also indicated by the obscure references to the leprosy of *places and clothes*.

LEPSIUS, KARL RICHARD, a celebrated Egyptologist and Orientalist, was born at Naumburg in 1813. He studied at the Universities of Leipzig, Göttingen, and Berlin, directing his work especially to philological subjects. In 1833 he went to Paris, where the next year he took the Volney prize for a treatise on Paleography (Leipzig, 1842). Other notable memoirs he sent at this time to the Academy of Berlin. In 1835 he went to Italy on a voyage of research, and was fortunate enough to attract the notice of Bunsen at Rome, who assisted him greatly, and directed his attention especially to hieroglyphics and other Egyptian subjects. He was seen in the forefront of the new Egyptology; and when he was sent to England in 1838, by the Archaeological Institute of Berlin, and found Bunsen there as ambassador, a project of Egyptian exploration was quickly elaborated between the two. English and German men of science and artists joined in the scheme, and the expedition left England in 1842. Every influence possible was brought to bear upon Mehmet Ali, then viceroy, and he loyally protected the travellers during the four years they stayed in Egypt. Lepsius was nominated professor at Berlin in 1842, before he went to Egypt; but his duties were nominal, even now that he had returned, to allow of his arranging and editing the fruits of the great expedition. Finally, in 1849, appeared the first instalment of the splendid "Monuments of Egypt and Ethiopia," and the publication continued till it closed with the twelfth of the colossal volumes in 1859. Meanwhile the "Universal Linguistic Alphabet" appeared in 1855—opening a field of inquiry still further worked upon in the "Standard Alphabet for reducing Unwritten Languages" (1863). Besides the splendid 900 pages of engravings of the "Monuments," Lepsius produced in 1842 "Selections of the most important Documents of Egyptian Antiquity," with twenty-three plates, and the same year "The Book of the Dead," with seventy-nine plates. These were results of his work at the British Museum. After the expedition he published as a result of his examination of the hieroglyphics a "Chronology of the Egyptians" (1849)—only the first volume of which appeared. In 1866 Lepsius paid a second

visit to Egypt and discovered a trilingual tablet, as linguistically valuable (though not of course of the same historical interest) as the Rosetta Stone; and in 1869 he returned for the third time in order to be present at the opening of the Suez Canal.

The last years of his life were devoted chiefly to the elaboration of his "Nubian Grammar"—a work of enormous labour, full not only of new material, but of new views on the relationship of the numerous languages of Africa. In addition to this, he was principal librarian of the Royal Library at Berlin, and a member of the Academy of Science. Professor Lepsius died in July, 1881.

LEPTIDÆ is a small family of insects belonging to the order *Diptera*, and closely allied to the Bee-flies (*Bombyliidæ*). The Leptidæ are distinguished by the proboscis being short and thick, and terminating in a pair of fleshy lobes. The antennæ are very short, composed of three short joints, the last of which bears a long bristle. The tarsi are furnished with three small cushions. The body is slender and of moderate size. *Leptis scolopacea* is common in England in meadows and woods; its larva lies in earth and decayed wood. One species (*Leptis cerulea*) is remarkable for the habits of its larvæ, which excavate funnel-shaped cavities in the sand, and, secreting themselves at the bottom, lie in wait for their prey. When an insect falls into the pit, the larva, suddenly rising, seizes it, and claspings the body sucks out the juices, after which it flings away the carcase. Another member of this family (*Atherix ibis*, common in this country, has an aquatic larva. The females attach their eggs in large clusters to branches overhanging the water, into which the larvæ fall when hatched. This fly is about one-third of an inch long, the female being ash-coloured, with spots and bands of black, the male tawny, with black markings.

LEPTINITE is a fine grained crystalline rock, composed of orthoclase and quartz; sometimes with garnets and kyanite as accessory minerals. It occurs mostly round the margins of granite masses; has often a foliated structure, but is generally considered to be of eruptive origin. It is sometimes termed *granulite*, and is essentially a fine-grained granite wanting mica; if the latter be present in small quantities it forms a passage rock to granite and gneiss.

LEPTOCEPHALUS is a name given to certain cartilaginous worm-like fishes, which are found floating in the sea often very far from land. These fishes were at one time regarded as forming a distinct group, or as larval forms of such fishes as eels. Dr. Günther ("Introduction to the Study of Fishes," 1889) regards them as representing an arrest of development at a very early period of their life, rather than a normal or larval stage of development. Under what circumstances marine fishes are liable to this abnormal condition is not certain. Dr. Günther conjectures that fishes usually spawning in the vicinity of land sometimes spawn in the open ocean, or that floating spawn is carried by currents to a great distance from land; and that such embryos, which for their normal growth require the conditions afforded by the vicinity of the shore, if hatched in mid-ocean, grow into undeveloped hydrocephalæ, such as the Leptocephali seem to be.

The Leptocephali have a long compressed band-like transparent body. The skeleton and skull are almost entirely cartilaginous. The head is very small and short, the eyes large, and the jaws in some specimens furnished with numerous minute teeth. There is one continuous vertical fin running along the back round the tail as far as the vent; it is sometimes a mere fold of skin without any skeletal support, and is sometimes entirely absent. Pectoral fins are sometimes present, but there are never any ventral fins. Gelatinous substance generally surrounds the notochord, and also separates the muscular segments.

The gill-openings are very small. There are four

branchial arches. In those forms in which the body is more or less cylindrical the blood is red; in flat forms the blood is never more than faintly coloured. The air-bladder is absent. The vent is very small, and cannot always be discovered; its position is variable in different examples. There is no trace of generative organs.

The Leptocephalids never attain a length of more than 10 inches, and most are not so large; their movements are slow and languid. One of these Leptocephalids was originally described by Yarrell from the British coasts as *Leptocephalus Morrisii*.

LEP'TON, the equivalent in Greece of the French *centime*, being the hundredth part of the Greek *drachma*, which is equal to the French *franc*. Greece forms one state of the Latin monetary convention.

LEP'US (the Hare), one of the old constellations, said by Hyginus to be in the act of running from Orion's dog, which is the greater dog according to some, and the lesser according to others. It is situated directly under Orion. See PLATE CONSTELLATIONS (S. Hemisphere, v.-vi.)

LER'NÆA. See EPIZOA and ENTOMOSTRACA.

LER'WICK, the capital town of the Shetland Islands, in the county of Orkney and Shetland in Scotland, is situated on the Island of Mainland, on the west shore of the Sound of Bressay, dividing Mainland from the Island of Bressay, which completely shelters the spacious harbour, protected by a fort. It consists chiefly of one long street irregularly built, the gables of the houses being turned to the street. The principal buildings are the town-hall, a handsome building erected in 1883, and decorated so as to illustrate the historical associations of the burgh, and including among other fine stained windows one which bears the inscription:—"The Chief Magistrate and Senate of Amsterdam have presented this tablet of painted glass to the Town-hall of Lerwick, in commemoration of services rendered to the seamen and fishermen of Holland;" the old town-hall, county buildings, erected in 1872, two handsome bank buildings, and places of worship belonging to the Established, Free, United Presbyterian, Wesleyan Methodist, Congregational, Baptist, and Episcopalian churches. Fort Charlotte is of some importance, and is the headquarters of the Royal Naval Reserve for the north. The town has some manufactures of straw-plait, hand-wrought stockings, &c. It is a great fishing station for herring, and a rendezvous of the Greenland whale-ships. The trade is important, and it has steam communication with Wick, Aberdeen, Leith, &c. Important improvements were commenced in 1883, which have greatly increased the facilities for shipping in the harbour. The population of the parish in 1881 was 13,051; of the town, 4015. The "tee," or nickname, locally given to Lerwick is "Whittings."

Lerwick was built more than 200 years ago, principally for the accommodation of the Dutch fishermen, 2000 of whose herring-busses were said then to have often frequented Bressay Sound. The town suffered from Dutch attacks during the reign of Charles II., and a tale is told that the famous Paul Jones was frightened from the bay by the sight of the red petticoats of the market women. Many of the inhabitants are of Scandinavian descent. The local jealousies are said to be unusually marked between the various towns in the neighbourhood.

LESAGE, ALAIN RENE, author of "Gil Blas," was born 8th May, 1668, at the village of Sarzeau, near Vannes in Brittany, and was educated at the Jesuit college of Vannes. He went to Paris in 1692, and qualified himself as an *avocat*, marrying in 1695 the daughter of a citizen whose face was her only fortune, but with whom he enjoyed for many years complete domestic happiness. He lost his fortune through a dishonest trustee, and then supported himself entirely by literature, till the Abbé de Lyonnet for a time gave him a pension of 600 livres. He

wrote upwards of a hundred dramas, the principal being "Don César Ursin" and "Crispin," which attained great popularity. But it was not till he was forty years old that his true genius declared itself. His comic novels then won for him a high place in literature, and have never been excelled by anything of the same kind. "Le Diable Boiteux," or "Devil on Two Sticks," published in 1707, had a prodigious success, and Sir Walter Scott declared the principal character, Asmodeus, to be as much a creation of genius as Ariel or Caliban. In 1715 he published the first two volumes of the work on which his fame mainly rests. Completed by the publication of a fourth volume in 1735, "Gil Blas de Santillane" occupies in French fiction the same place as "Don Quixote" in that of Spain, and "Tom Jones" in that of Britain. His comedy of "Toucanet" is really admirable (1710), but the intrigues at the Théâtre Français prevented its due success, and by the disgust Lesage felt at the treatment he received we are deprived doubtless of many fine works, for he never wrote another comedy of this rank. Lesage died at Boulogne in 1747. Unlike most authors of his day he received scarcely any solid patronage from man or woman. The gift of the Abbé mentioned above is almost the only instance.

LESLIE, SIR JOHN, a distinguished mathematician and physicist, was born 16th April, 1766, at Largo, a village on the coast of Fifeshire. He studied at the University of St. Andrews, and afterwards travelled in America as a private tutor. Some years after he was elected to the professorship of mathematics in the University of Edinburgh. At this period his only production relative to pure mathematics was an essay on "The Resolution of Intermediate Equations." In 1809 he was called to the chair of natural philosophy. He was knighted 27th June, 1832, and died 3rd November in the same year, at his residence in Fifeshire.

Besides some other works, Sir John Leslie has left— "Elements of Geometry, Geometrical Analysis, and Plane Trigonometry," "Geometry of Curve Lines," "Philosophy of Arithmetic," "Account of Experiments and Instruments depending on the relations of Air to Heat and Moisture," "Elements of Natural Philosophy" (containing Mechanics and Hydrostatics). He is also known as the inventor of the differential thermometer, an instrument of which he made great use in the prosecution of his researches into the nature of heat and its modes of transmission, and of a hygrometer and a photometer, besides some other instruments of lesser importance.

LESPINASSE, JULIE JEANNE ELEONORE DE, the name of a lady celebrated in Parisian literary circles about the middle of last century, was born in 1732. The illegitimate daughter of the Countess d'Albon, she was employed to read to and converse with Madame du Deffand in her blindness; but being ambitious, well-informed, and eloquent, she attracted to herself the interest of the circle surrounding Madame du Deffand, and was dismissed by that lady, whose spite at least equalled her wit. She died in 1776. Three volumes of her love-letters, conspicuous for very ardent eloquence, were published in 1809. Her name is associated with that of D'Alembert, with whom she lived in a sort of half friendly relationship from the time they both left Madame du Deffand till the lady's death. But the love-letters are addressed to the Comte de Guibert.

LES'ING, GOTTHOLD EPHRAIM, was born at Kamnitz in Upper Lusatia, of which place his father was pastor, 22nd January, 1729. His attachment to reading displayed itself from his earliest childhood. From a school at Meissen he was sent to the university at Leipzig. His first literary productions were one or two minor dramatic pieces, which were printed in a journal entitled *Ermunterungen zum Vernügen*.

In conjunction with his friend Mylius he began a quarterly publication at Berlin, *Beiträge zur Historie des Theaters*, which, however, was not carried on beyond its fourth number. After some minor speculations, he formed a close intimacy with Moses Mendelssohn and Nicolai, which had a highly beneficial influence upon each of them. One of the first results of their joint studies was the dissertation, "Pope als Metaphysiker" (1751), the object of which was to show that the English poet had no fixed philosophical system. His next work was his "Miss Sara Sampson," the first specimen of domestic tragedy in German literature.

In 1757 he and his friends undertook the *Bibliothek der Schönen Wissenschaften*, which may fairly be said to have been the best literary journal Germany could then boast of. To this period, from 1753 to 1760, during which he resided at Berlin, belong his "Fables" and his "Literaturbriefe," or "Letters on Literature" (1759), a life of Sophocles, after the manner of Bayle, and a translation of Diderot's dramatic pieces. From 1760 to 1765 Breslau was his residence, he having accepted the appointment of government secretary to General von Tauenzien. Here he seems to have injured his health by the excitement of the faro-table; but eventually giving up both play and his appointment, he returned to Berlin, and published his celebrated "Laocöon." The following year was marked by another triumph—namely, his "Minna von Barnhelm," and the succeeding one by his "Dramaturgie" and the "Antiquarische Briefe." His "Emilie Galotti" was published in 1772. His last drama, "Nathan der Weise," was also almost the last of all his literary productions. In it Nathan the Jew, Saladin the Mohammedan, and one of the Templars for the Christians, form the chief characters, and by the famous episode of the fable of the ring, Lessing has sought to demonstrate the inner unity of all true religions. It is certainly one of the noblest productions of religious poetry, and few men are so bigoted as not to follow the inspired clarity of the large-hearted poet. He had entered only into his fifty-third year when he died, 15th February, 1781.

His brother, Karl Gotthelf Lessing (born 10th July, 1740), who published his biography and some posthumous pieces, in 1793, wrote several comedies, which exhibited considerable dramatic talent.

L'ESTRANGE, SIR ROGER, was born in Norfolk in 1616. Like his father he was a royalist, and accompanied Charles I. to Scotland in 1639. He was arrested by the emissaries of the Parliament in 1644, and sentenced to be shot as a spy, but escaped in 1648, and attempted to raise an insurrection in Kent. This having failed, he fled the country, but returned in 1653, hoping to take advantage of the general act of amnesty. Cromwell having taken his part, his hopes were realized. After the Restoration he was appointed censor of the press, and in 1665 he brought out a paper called the *Public Intelligence*. He was devoted to the court, and on the approach of the Revolution of 1688 lost all his appointments. He died in 1704. His works consist of a vast number of political pamphlets, besides indifferent translations of Josephus, Cicero's "Offices," Seneca's "Morals," Erasmus' "Colloquies," Esop's "Fables," Quevedo's "Visions," &c.

LE'THE, in Greek mythology, the personification of oblivion. One of the rivers in Hades, the home of departed spirits, was called Lëthê. Its waters possessed the quality of causing the spirits who drank them to forget the whole of their former existence.

LE'TO, the name of the goddess in the old Greek mythology whose attributes the Romans applied to their own goddess Latona. She represents the hidden forces of nature. Her name is akin to the Greek *lithê* and the Latin *latus* (oblivion and hiddenness). From her come forth the sun-god and the moon-goddess, Phoebus and

Phoibê, otherwise called Apollôn (Lat. *Apollo*) and Artemis (Lat. *Diana*), but she herself is never seen. Hesiod claims Lêtô as the wife of Zeus even before Hêra; but he is alone in this circumstance. Other poets make her beloved of Zeus but tormented by the jealousy of Hêra. In her trouble she wandered over all the earth, and every place refused to harbour her, because of dread of Hêra's fury. At last she reached the island of Ortygia, which floated continually from place to place. Zeus chained it to the sea-bottom, and here at last Lêtô bore the twin gods to him. The island was called Dêlos ever after. Lêtô was worshipped in Dêlos with her son and daughter.

Some myths are connected with Lêtô. Tityos, a giant, insulted her and was punished by being chained in Tartaros while two vultures everlastingly gnawed his liver, which grew afresh as fast as they devoured it. The most celebrated of all is the destruction of the children of Niobe.

LETTERS OF MARQUE was the name given to a commission formerly granted by the crown, authorizing a privateer to make war upon and seize the property of another nation with which the sovereign was engaged in war. All private vessels making war upon or seizing the property of another nation without carrying a commission called letter of marque, granted through the lords of the Admiralty, were treated as pirates. Letters of marque were abolished among European nations by the treaty of Paris in 1856, but the government of the United States refused to become a party to this agreement. An opinion has been repeatedly expressed among politicians that this treaty would hardly stand the test of a prolonged naval war, and during the dispute between England and Russia in 1855 the Russian press openly threatened England with privateering in spite of the treaty. At the same time there can be no doubt that the abolition of privateering is very desirable in the interests of civilization, and the existence of the agreement referred to would warrant the use of very stern measures for its repression should it at any time be revived.

LETTERS PATENT, the king's letters, sealed with the great seal. These grants, says Blackstone ("Comment." b. ii. ch. 21), whether of lands, honours, liberties, franchises, or anything else that can be granted, are contained in charters or letters patent, that is, open letters, *litera patentes*. They are so called because they are not sealed up, but open to view, with the great seal pendant at the bottom, and are usually directed or addressed by the king to all his subjects at large. They are now frequently granted under the royal authority as the reward of ingenuity, and are in some cases the only means by which a man can secure any compensation for a discovery, or for the labour and expense which he may have employed in perfecting an invention. The consideration of the legal rights of patentees, and of the modes in which they may be acquired and secured, properly belongs to the head of PATENT. Many letters patent have been granted by the king to the founders of schools and other charitable endowments, empowering the donor to make rules and ordinances for the government of his charity, and constituting into a body corporate those persons and their successors whom the founder should choose to nominate.

LETTER-WOOD is the heart of a small tree, 8 or 9 feet high (*Brosimum discolor*), found in the forests of British Guiana, Brazil, and Peru. It belongs to the bread-fruit tribe ARTOCARPACEÆ. It is called letter-wood on account of the beautiful black marks on its rich dark-brown wood, which bear some slight resemblance to the old black-letter printing. The outer layers of the tree are white, and only the central portion or heart is of this dark colour; it is also extremely hard and heavy. It is scarce and valuable, and used for fine veneers and inlaying. It is sometimes called Snake-wood.

LETTRES DE CACHET were originally the closed letters of the kings of France which, folded and sealed

with the king's smaller seal, were used to make known the king's pleasure to corporations and individuals, as distinguished from the *lettres patentes*, which were open, sealed with the great seal, and addressed to all men. They were chiefly used as warrants for imprisonment and to supersede the ordinary warrants and processes of the law, and they ultimately became the instruments of intolerable tyranny. Not only were they used by the ministers of the king to remove opponents from their path and to punish those who criticised the measures of the government, but they were also allowed to become the means of obtaining private revenge. *Lettres de cachet* were often signed in blank, and thus given or sold to members of the nobility and others, who, when they wished to procure the imprisonment of an enemy, just filled in his name and gave the letter to the police for execution. By virtue of this warrant a man might be arrested and kept in prison without trial, and he might even be prevented from communicating with his friends; hence it sometimes happened that a prisoner was forgotten after his arrest, and remained in confinement for life, though untried and uncondemned. *Lettres de cachet* were abolished by the Constituent Assembly, 15th January, 1790, and on 13th March of the same year all imprisoned under them were ordered to be set at liberty.

LETUCE (the *Lactuca sativa*, or garden lettuce) is one of the principal kinds of vegetables used for salads, and it also forms an ingredient in some kinds of soup. It has been introduced and cultivated in this country for nearly three centuries, but, like many other domesticated plants, its origin is unknown. The excellence of lettuces consists in their being crisp and tender; their growth should therefore sustain no check or interruption.

The ground intended for the seed should be fresh dug, rich, and mellow. The principal summer crop should be sown in March and April, and the seed lightly covered. If the plants are intended to attain their full perfection where sown, they must be thinned out to distances of 9 inches square in the case of the small cabbage varieties, and the larger sorts should be allowed at least a foot each way. Water should be given, but not at any one time to excess, not merely at the root of each plant, but over the whole of the ground.

The Cos Lettuces are those which include lettuces of an erect, oblong form of growth. They require to have their leaves tied together moderately close with a strip of matting, for the purpose of assisting their blanching, and rendering them more crisp and delicate. This should be done about a week previous to their attaining full perfection. The rounded spreading forms are called Cabbage Lettuces.

LEUCIC ACID, an acid obtained by the oxidation of leucine. It crystallizes in colourless trimetric prisms, melting at 73° C. (163° Fahr.) It is soluble in water, alcohol, and ether. At 100° C. (212° Fahr.) it volatilizes unchanged. The formula is $C_6H_{12}O_6$. It combines with all the metals, alkalies, and alkaline earths, forming leucates, mostly soluble and crystallizable. Leucic ether ($C_6H_6O_6$) is an oily liquid of specific gravity 0.9613, boiling at 175° C. (347° Fahr.)

LEUCINE, a basic substance found widely diffused in the human body, and in other animal organisms. It is soluble in alcohol, from which it crystallizes in shining colourless scales. It melts at 170° C. (338° Fahr.) and sublimes unchanged. It is soluble in water, but insoluble in ether. The formula is $C_6H_{13}NO_2$. It combines with acids, forming crystalline salts.

LEUCISCUS, a genus of fishes of the family Cyprinidæ, distinguished by having short and soft anal and dorsal fins, a mouth unfurnished with barbules, and the body covered with imbricated scales. There are many species found in equal abundance in the fresh waters of the northern temperate regions of both hemispheres. About ninety species are known, fifty of which are American. Those best known

in Britain are the Roach (*Leuciscus rutilus*), the Dace (*Leuciscus vulgaris*), the Chub (*Leuciscus cephalus*), the Rudd (*Leuciscus erythrophthalmus*), and the Minnow (*Leuciscus phoxinus*). More rare are the Graining (*Leuciscus Lancastriensis*) and Azurine (*Leuciscus ceruleus*), formerly supposed to be peculiar to the north of England, but stated by Agassiz to inhabit certain Swiss lakes. These two latter species are regarded by some authorities as varieties of the dace and rudd respectively. The Ide (*Leuciscus idus*) is common in the central and northern parts of Europe. The North American are less perfectly known; the larger ones are known vaguely in popular language as Dace, the smaller as Minnows. Most of these fishes are sought after by anglers, either for the sport they afford, or to be used as bait for pike. None of them are very excellent as food. The roach and chub have been known to attain a weight of 5 lbs. The more important of these species are noticed more fully under separate articles, as CHUB, DACE, ROACH, &c.

LEUCITE (Gr. *leukos*, white) is a mineral found abundantly in certain volcanic rocks. It is a silicate of alumina and potash, has a hardness of 5·5 or 6, and specific gravity of 2·5. It occurs in small grains or icositetrahedrons, almost isometric, but considered to belong to the tetragonal system (from its optical characters), though some mineralogists consider it rhombic, and others again either monoclinic or triclinic; the form is very similar to that of a garnet, hence it is sometimes called white garnet and also amphigene. Leucite occurs mostly in the Italian volcanic rocks; the leucite lava (leucitophyr) of Rome has been worked into millstone for over 2000 years.

LEUCORYX. See ORYX.

LEUCTRA, the battle in which Epaminondas established the supremacy of Thebes in ancient Greece, B.C. 371. The battlefield lay midway between Thespiæ and Plataiæ (Lat. *Platœa*) in Bœotia.

LEU'WENHOEK. See LEEUWENHOEK.

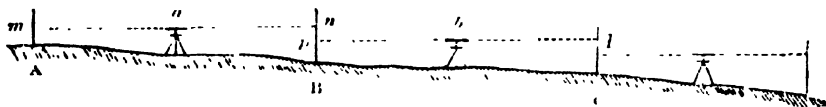
LEVANT' or LEVANTE, an Italian word which means "sunrising," and is applied to that portion of the Mediterranean Sea east of Crete. It is also commonly

used, especially among seafaring and commercial people of the countries bordering on the Mediterranean, to designate the eastern or Asiatic shores of that sea, namely, those of Syria and Asia Minor, the harbours of which are styled "Scale di Levante;" in French "Echelles du Levant" (stairs of the East). Smyrna, Alexandretta, Beyrout, Acre, the harbours of Cyprus, and other islands near the coast of Asia, are included within this denomination.

LEVEE', the state ceremonial of the sovereign receiving at court those subjects who are entitled to that honour. A levee differs from a drawing-room in that it is exclusively for gentlemen. It was formerly the custom of the sovereigns of France to receive at the hour of their *levée*—that is, while making their toilet—the visits of certain persons entitled to that distinction; hence the name of *levée*.

LEVELLING is the art of determining the heights or depressions of points on the ground with respect to a spherical or spheroidal surface coinciding nearly with that of the earth, or, when the extent of ground is inconsiderable, with respect to a horizontal plane passing through some given point on the ground.

The relative heights of a series of points on the ground are obtained by means of their vertical distances from others which, on the supposition of the earth being a sphere, are equally distant from its centre; and these, which are called level-points, must be found by an instrument constructed for the purpose. [See SPIRIT LEVEL; THEODOLITE.] In general, a choice is made of any convenient stations, A, B, &c., on the line of operation, and the distances between them are determined by actual admeasurement. The instrument is then set up at or near the middle of the interval between every two such points in succession. When the telescope, thus placed, as at *a*, has been rendered horizontal by means of the adjusting screws, an assistant at each of the stations A and B, holding what is called a station staff in a vertical position, moves a vane or index along the staff, upwards or downwards, according to the directions of the observer at the



telescope, till it appears to coincide with the intersection of two wires in the telescope.

The points thus determined on the staves are represented by *m* and *n*; and these are level-points, or points equally distant from the centre of the earth. Therefore the heights *Am* and *Bn* being read on the graduated staves, the difference between them will give the relative heights of the ground at A and B. A similar process is repeated with respect to the points B and C, the instrument being placed at *b*, midway between them; and the operation is to be continued to the end of the line on which the profile is required. It is customary to insert the heights, *mn*, &c., in a column headed *Fore Sights*, in a sort of field-book, and the heights, *Am*, *Bn*, &c., in a collateral column headed *Back Sights*. The difference between the sums of the numbers in these two columns will be equal to the height of one extremity of the line above the other.

It is, however, very frequently the practice to execute a sort of double-levelling; which consists in placing the instrument successively at each of the stations, A and B, a staff being held up vertically at the other, when the axis of the telescope being at equal heights from the ground at both stations, half the difference between the heights read on the staves will express the height of A above B. This

is strictly correct, however, only on the supposition that the visual rays at both stations are parallel to one another, and it must be evident that in very extensive surveys some allowance must be made for the earth's curvature.

On ascending or descending a steep hill, no other method can be adopted than that of placing the instrument at one extremity of the station line and the staff at the other; but as these lines are then necessarily very short, the deviation above mentioned need not be regarded.

The profile of the ground is usually expressed on paper, in portions of any convenient length, for the purpose of enabling the engineer to determine the depth of his excavations, or the heights of the masses of earth to be raised, when it is proposed to execute a railway or road. A right line being drawn to represent one parallel to the horizon, and passing through the highest or the lowest point of the natural ground, the heights or depressions of the remarkable points, as A, B, &c., with respect to such line, are obtained by additions or subtractions from the numbers in the field-book, and are, by a proper scale, set out from that line on others drawn perpendicularly to it at intervals equal to the horizontal distances between the same points. The series of points thus obtained, being

joined by hand or otherwise, give the figure of the required vertical section of the ground. See SURVEYING.

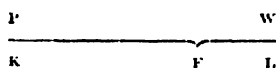
LEVEN, LOCH, a beautiful and interesting lake of Scotland, in the county of Kinross, of a roundish or oval form, about $4\frac{1}{2}$ miles long by $2\frac{1}{2}$ broad. It contains seven islands, on one of which are the ruins of Loch Leven Castle, in which Queen Mary was imprisoned and signed her abdication, and from which she escaped before the battle of Langside, 2nd May, 1568. The extent of water is now about 3406 acres, about 1100 acres having been reclaimed by drainage operations between 1826 and 1836. On St. Serf's Island (the largest) are some interesting ruins of a priory, representing an early Culdee foundation. The lake has been noted for its trout fishing even as far back as 1633, when an Act was passed for the protection of fish spawning in any of the rivers discharging into it. The lake receives several small streams, and discharges by the river Leven, which flows east, and falls into the Frith of Forth, 3 miles south-west of Largo, after a course of 15 miles.

LEVER (Lat. *levare*, to lift up), the name of a common mechanical instrument, consisting, in its simplest form, of a bar of wood or metal, by fixing one point of which, called the fulcrum, a pressure at one point is made to counterbalance a pressure at another point.

The first explanation of the lever in what is called its first form was given by Archimedes, and that in so simple a manner that while his method has always been the best for a popular view of the subject, it has never been surpassed, or even equalled, in rigour or purity, considered as a foundation for the science of statics.

It assumes two principles—first, that when a system is in equilibrium, the state of rest will not be disturbed if additional pressures, such as compensate each other, and would by themselves produce no motion, be introduced or removed; secondly, that when a weight is made to rest by being attached to an immovable point (say it is suspended by a string), the point or pivot of suspension undergoes a pressure equal to the weight of the entire system, whatever may be the form of that system, or the dispositions of its parts. Thus, a cylindrical or prismatic bar of uniform material will necessarily rest if a pivot be passed through the middle of its length, since there is no reason why it should preponderate on either side; now, divide the whole length of the bar into any two parts, and from their middle points suspend weights equal to the weights of the parts; also apply counterpoises of equal weights at the same points, by means of strings passing over pulleys; the equilibrium will then be undisturbed; take away from the system the parts of the bar and the counterpoises (which are equal and opposite to one another), and the equilibrium will subsist between the remaining weights, which are those first suspended. The points of suspension being at the middle of the lengths of the two parts are at equal distances from the pivot (at the middle of the whole length of the bar), which are inversely proportional to the suspended weights.

The most simple way in which the preceding result can be stated is as follows: when a power, P , placed at K , balances a weight, w , placed at L , about the pivot or fulcrum F , the number of pounds in P multiplied by the number of feet in KF gives the same product as the

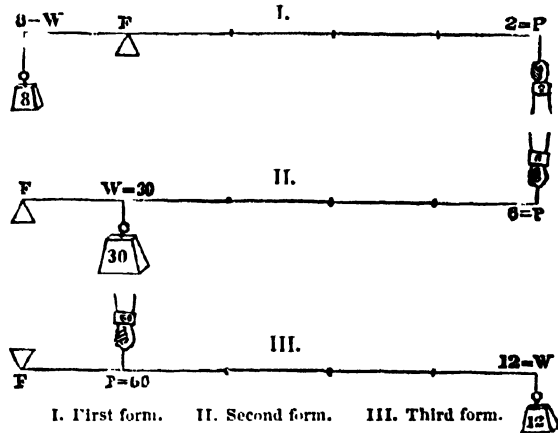


number of pounds in w multiplied by the number of feet in FL . (Any other units of weight and length will do equally well, if only the same be used in both.) The product of a pressure and the perpendicular let fall upon

its direction from a fixed pivot or fulcrum is sometimes called the moment, sometimes the leverage, of the weight (and by workmen the purchase).

In English treatises on mechanics it is customary to call one of the pressures which balance on a lever the power, and the other the weight. Levers are thus distinguished as of the first, second, or third kind, according as the fulcrum, the weight, or the power, is in the middle. See Plate, figs. 1, 2, 3.

First form.—This has already been described. The equation is $P \times AF = w \times BF$ (see Plate, fig. 1); therefore the longer AF is, the less power is required at P to balance a given weight, w . A crowbar is a lever of the first form, and a pair of scissors is a doubled variety.



Second form.—Here the weight, w , is in the middle, and the power, P , must act upwards, or it may act over a pulley, as in the Plate. The equation remains the same, $P \times AF = w \times BF$. The action of the oar in a boat, of the wheelbarrow, of nutcrackers, &c., are examples of this form.

Third form.—Here the power is between the weight and the fulcrum, and the pressure on the fulcrum is reversed in direction. The formula still remains the same, whence it follows that since $P \times AF = w \times BF$, and AF is much shorter than BF , P must be by so much larger than w . Here, therefore, we have the best form when power is plentiful and a rapid motion is desired to be produced, for it is evident that in this (third) form a little motion at A produces a much greater sweep at B . If on the other hand power is scarce, but moves freely, and a heavy weight has to be lifted slowly, the second form of lever would be preferable to the third, since here the point A moves more rapidly than the point B , and P is always less than w . Further, the pressure on the fulcrum differs in all three forms; in the first form, as said above, the whole system weighs upon the fulcrum, and (leaving aside the weight of the bar-lever itself) the pressure on the fulcrum is $P + w$; in the second form it is $w - P$; and in the third form it is $P - w$. Examples of levers of the third kind are most muscles in the human body which move bones, as the arm, leg, &c., a pair of tongs, a lathe-treadle, organ pedals, &c. The above illustration gives some indication of the varying advantages of the three forms of lever.

If several powers (P, P', P'') are to be made to balance several weights (w, w', w''), as in fig. 4 in Plate, then the equation must be as follows:—

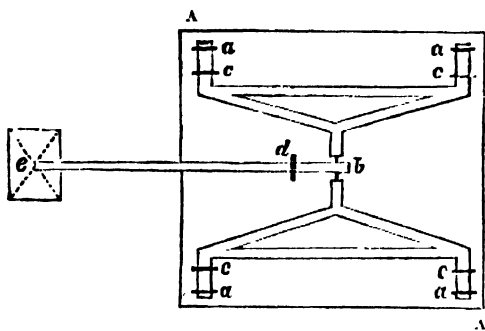
$$P \times FA + P' \times FA' + P'' \times FA'' = w \times FB + w' \times FB' + w'' \times FB''$$

If a chain of levers be used so that each acts as the

moving force on its successor, the first of the series bearing the power, P , and the last of the series the weight, W , as in fig. 5, then we have a *compound lever*, and the equation (disregarding the elasticity and weight of the levers themselves and the pressure on the several fulcra) is as follows:—

$$P \times FA \times F'A' \times F''A'' = W \times FB \times F'B' \times F''B''$$

The cart weighing-machine, of which the annexed is a sketch in plan, presents an elegant combination of levers or *compound lever*, by which the proportion of the power is to the weight, when balanced, generally as 1 to 28, or 4 lbs. to the cwt. AA is a square frame fitted for the reception of the apparatus. At the four corners are fixed four fulcra, a, a, a, a , on which the triangular levers, aab , $aa'b$, rest by their extremities. There are thus two fulcra to each lever, which may in fact be looked upon as two levers combined into one at b . At the points c, c, c, c ,



Plan of Cart Weighing-machine (Compound Lever).

5 inches from a and c , the top-plate, which receives the load to be weighed, rests by four legs. Thus the pressure of the load is communicated by the four corners to the extremities bb of the levers, which are 20 inches perpendicular distance from aa and cc . These are suspended by links to a steel centre fixed at b in the lever bde . The distance bd from the fulcrum is 6 inches, and de is 12 inches, the scale for the weight being hung at e . To calculate, then, the proportion of the power to the weight to be balanced, the levers aab are of the second class, the weight being between the fulcrum and the power; and the respective distances of the weight and the power from the fulcrum are 5 and 20, or as 1 to 4; so that the balancing effort at b is one-fourth of the whole load. Again, the lever bde is one of the first class; for the fulcrum d is in the middle, and its distances from the points b and e are 6 and 12 inches, or in the proportion of 1 to 2, showing that a force at b will be balanced by one-seventh of itself at e . Now the force at b , as we have already found, is one-fourth of the whole load; so that the force at e necessary to balance it will be one-seventh of one-fourth of the load, or $\frac{1}{28}$. Thus the machine requires 1 lbs. on the scale for every cwt. on the table. The weight of the moving parts of the machine is previously balanced by counter-weights.

Bent Lever and Oblique Pressures.—In these cases (in figs. 6 and 7 in the Plate), the forces acting round the fulcrum must be resolved into forces perpendicular to an imaginary or actual straight lever resting on the fulcrum. Thus the bent lever $A'F'B'$ (fig. 6) is manifestly the same for purposes of calculation as the straight lever AFB for a force $A'F =$ the forces AF and $a'F$, and the latter simply presses on the fulcrum, leaving AF the sole effective force. So with the oblique pressure on A or n in the illustration (fig. 7), the force $DA =$ the forces DC and CA , but of these CA is the only effective part.

The *Steelyard* (fig. 8) is a very useful application of a

lever of the first kind. The further the weight P (here serving as the "power") is moved from the fulcrum F the greater the weight, W , which it can support. The formula is best shown by taking $m = FB$ (invariable); $p = FD$ (variable); Q the weight of the beam AB , and q the distance of the centre of gravity from the fulcrum. Here P is invariable, W variable. The equation is as follows:—

$$Wm = Pp + Qq.$$

If the shape of the bar be such that the centre of gravity lies on the side of W , the quantity Qq would change sign, and the equation would be

$$Wm = Pp - Qq.$$

The *Wheel and Axle* (figs. 9, 10, 11), if closely regarded, is seen to be but a continuous form of lever; for it is evident in fig. 11 that the action of P , at the circumference ED , upon W at the axle A is that of a lever of the first kind along the line ASB , S being the fulcrum, and the equation would be

$$P \times DS = W \times AS.$$

A very common form of this system is that of the winch over a well (fig. 10). Here the power (P) is applied at the end of a handle, and the longer the handle the greater the leverage and the easier the machine. The weight (W) is the bucket of water to be raised. The advantage of the wheel and axle is that the leverage is continuous, instead of being limited in its range to and from as in levers of the three usual forms. Another application of this principle is by a rope passing round a drum, as in a capstan, where the power is applied at the extremity of the spokes, or as in fig. 9, where a barrel (W) hanging from a beam serving as an axle is raised by a rope passing round a large circular frame on that axle, or by pulling at the spokes SSS , as the steersman does at those of the ship's wheel. The leverage is the excess of the radius of the large wheel over that of the axle CD . G is a ratchet wheel to prevent running back if the rope should break.

LEVERET (from Lat. *lever* = *to pour*-, the stem of *lepus*, a hare), the young of the HARE in its first year.

LEVERIDGE, RICHARD, a celebrated singer towards the end of the seventeenth and beginning of the eighteenth centuries, for whom Purcell wrote most of his bass songs. He is best known by his beautiful tune to Gay's "Black-Eyed Susan." It is now admitted that the view that Leveridge was the author of Lock's music to "Macbeth" cannot be substantiated. In the year 1708 Leveridge wrote new music for the second act; and this (now forgotten) music formed the basis of a claim for the authorship of an entirely different and earlier work. During his life Leveridge published several of his songs, in two 8vo volumes. He died in 1758.

LEVITES, among the ancient Jews, were the descendants of the tribe of Levi, who in the later stages of the history of that nation were usually employed in the inferior offices of the temple, in which they were distinguished from the superior priests, who were of the same race, and from those who were of the family of Aaron. They were divided into three classes—the first for preparing the offerings for sacrifice; the second for the performance of vocal and instrumental music; and the third for taking charge of the gates of the temple and acting as its guards. According to the traditional view, which still finds many advocates, the appointment of the Levites to their position in connection with the worship of Jehovah takes its origin in the legislation of Moses, by whom the members of the tribe of Levi were set apart as a sacred caste in Israel. It is believed that, with many others of the laws of Moses, those relating to the Levites fell into abeyance during the period of the Judges and the early days of the monarchy, but that under David and Solomon they were revived and enforced,

and though the history of the Levites was marked by many mutations, they never wholly lost their connection with the temple worship until its destruction. By many modern scholars, however, the story told in Gen. xxxiv., and referred to in Gen. xlix. 5-7, is regarded as giving, under the form of a personification, the record of an event in the history of the tribes during the early portion of their stay in Canaan, by which the families of Simeon and Levi, in consequence of a treacherous onslaught upon their neighbours, were broken up and dispersed. As, however, the great lawgiver had belonged to the tribe of Levi, its members, and especially his descendants, were regarded as being peculiarly suited to undertake the work of the priesthood, and being employed by the rest of the people in this capacity they gradually formed a united sacred order in the land. According to this theory the distinction between priests and Levites is of post-exilic origin.

LEVIT'ICUS, the third book of the Pentateuch, is so called from the laws it contains concerning the ordering of the priests and Levites. In the Hebrew it is known by its first word *Wajyikra*. It consists almost entirely of laws, which may be divided into the following sections:—(1) The laws relating to sacrifices, chap. i-vii.; (2) an account of the consecration of Aaron and his sons, with the episode of Nadab and Abihu, chap. vii.-x.; (3) laws concerning purity and impurity, chap. xi.-xvi.; (4) laws to mark the separation of the Israelites from their neighbours, chap. xvii.-xx.; (5) regulations concerning priests, chap. xxi.-xxiii.; (6) commandments respecting holy days and festivals, and (7) an appendix with the laws relating to vows. The book claims to be the work of Moses, and to embody legislation given during the wanderings in the desert, and this view, which was universally accepted until a comparatively recent period, is still maintained by many eminent scholars. On the other hand there are an increasing number of critics who ascribe the levitical legislation to the post-exilic period. For an account of this controversy see PENTATEUCH.

LEVY, the act of a compulsory raising of a body of troops for the defence of a country or for the purposes of war. The mode of making a levy varies with the purpose for which it is raised. If only for recruiting the army, the district selected may draw them by lot from the males of the required age. In other cases it is restricted to a class, as for instance, all men between the ages of twenty and twenty-five. In very urgent cases a general levy is made of all persons capable of bearing arms. In Britain the levy is well sustained, and its vacancies filled by volunteers; but in nearly every other country of Europe conscription prevails. In America, during the civil war, large levies were raised at various times. In some instances those on whom the lot fell could only escape serving by providing an able-bodied and healthy substitute.

LEV'YNE occurs crystallized; primary form, an acute rhomboid. It is whitish, translucent, and has a vitreous lustre. Its elements are silica, alumina, lime, soda, potash, magnesia, and water, of which the first occupies about one-fifth of the whole weight.

LEWES, a market-town of England, and the capital of the county of Sussex, 8 miles N.E. from Brighton, and 50 S. by E. from London by the South Coast Railway, is situated chiefly on the west bank of the Ouse, and partly stretches along the level ground, and partly up a steep and commanding acclivity, crowned by an ancient castle. It is surrounded by the chalk-downs in almost every direction, and through a gap the Ouse makes its way to the sea at Newhaven. It is navigable without locks 2 miles above the town, and with locks 10 miles further up, in all about 19 miles. The principal points of interest in the town, which is encircled with delightful scenery, are the castle, the priory, and the churches. The castle was built, or rebuilt, by William, earl de Warrene, son-in-law of the Conqueror. In the fourteenth century it passed to the

Arundels of Wardour. Its gate-house and keep are in excellent preservation; from the summit of the latter may be obtained a panorama of extraordinary beauty. The remains of the venerable priory of St. Pancras, founded by Earl de Warrene and his wife Gundrada, whose coffins were discovered among the debris of the priory church, are scanty, but of high archaeological interest. It was occupied the night before the battle of Lewes (11th May, 1264) by Henry III., and after his defeat by Simon de Montfort and the barons' army, afforded a refuge to his son, Prince Edward. It was the first Cluniac religious house established in England, and the only one for a century and a half. Southover Church is a pile of great antiquity, containing some early Norman work. St. Anne's is a good transition Norman building, which has been restored. In St. Michael's two ancient brasses are preserved. St. John sub-Castro is modern; the churchyard occupies the site of a small Roman camp. The other public buildings are several chapels, town-hall, free grammar-school, house of correction, market-house, Fitzroy Library, mechanics' institute, theatre, corn and hop exchange, three banks, and the Spital almshouses. In 1877 a massive monument was erected here, by order of the Emperor of Russia, to the memory of twenty-eight Russian soldiers who died while prisoners of war in Lewes gaol—1854 to 1856. There are iron foundries; and shipbuilding, brewing, tanning, paper and rope making, and lime-burning, employ many of the inhabitants. The chief trade is in grain, malt, sheep, cattle, and coal. The spring and summer assizes and quarter sessions are held here. It is the seat of a county court, and the head of an archdeaconry and deanery. The borough sent two representatives to the House of Commons from the time of Edward I. to 1868, and one from 1868 to 1885.

The fact of Lewes being a Roman station seems extremely doubtful; but it had acquired its present name (said to be derived from *lesweas*, the Anglo-Saxon word for pastures) at least two centuries before the Norman Conquest. William the Conqueror fixed on Lewes as the site of one of those fortresses by which he kept in awe his Saxon subjects.

LEWES, GEORGE HENRY, a distinguished man of letters, critic, scientist, and philosopher, was born in London in 1817, and died there in 1878. His father was an actor, and he himself had at one time thought of the stage. His powers of dramatic narration were very remarkable, though known only to his friends during his life. This accounts for the exceedingly penetrating criticisms on drama and the art of acting which Lewes from time to time put forth. His work in this direction is very valuable; the chief results being "The Spanish Drama" (1846) and the well-known "Actors and Acting" (1875). His greatest literary performance is undoubtedly his "Life of Goethe" (1855), still the best presentment of that varied and gigantic intellect. Lewes's novels and plays, though good, were not equal to his other work. He was editor of the *Fortnightly Review* from 1865 to 1867. His scientific studies were not seriously pursued till he had reached middle life, but he had in his youth studied physiology and medicine, thinking to embrace one of those professions, and his fertility of invention and great skill of analysis, combined with a certain contempt of authority and audacity of speculation, made his work extremely valuable, quite as much for what it suggested and what it unsettled as for what it actually accomplished. The chief scientific books of Lewes are "Sensative Studies" (1858), the excellent "Physiology of Common Life" (1859), "Studies in Animal Life" (1862), and the interesting translation with commentary of "Aristotle's National History" (1864), which he called modestly (as its subtitle) "A Chapter from the History of Science." The philosophical works of Lewes are very valuable even to those who

cannot accept his conclusions. Entertaining a strong disbelief in the efficacy of *a priori* research, and especially of the methods of metaphysics to which Kant had given new life in the previous century, and deeming the very end and aim of metaphysics a straining after the unknowable, he sought to demonstrate these views by a brilliant *reductio ad absurdum*. This was nothing less than a history of philosophy, on a biographical plan, wherein the actual result of each teacher's life was presented as of no avail in extending the realm of knowledge beyond the powers of perception. The first edition came out in 1845-46, and at this time Lewes was strongly Comtist, but there were several later editions, and these show a marked alteration in his philosophical standpoint. His final work in philosophy, into which he also threw all his accumulated knowledge of nervous physiology, is called "Problems of Life and Mind." It is unfinished as a whole, for death overtook him at his task, but the several parts are complete within themselves. The most important are "Foundations of a Creed," and "Physical Basis of Mind." From 1854 to his death Lewes lived with George Eliot (Mary Ann Evans) the novelist. Circumstances rendered it impossible for them to be married, and many have always considered that it was wrong, even under exceptional conditions, to overstep the recognized boundaries of conduct.

LEWIS, MATTHEW GREGORY, a writer of novels, poems, and dramatic pieces, was born at London on the 9th of July, 1775. He studied at Christ Church, Oxford, and afterwards lived for some time in Germany. There he became acquainted with Goethe and his followers, and imbibed the mysterious and tragic spirit of which his writings are full. Previous to his residence in Germany, when only sixteen years old, he wrote a successful comedy, called "The East Indian." The novel by which he is chiefly known, "The Monk," was published in 1791, when he was in his twentieth year. In 1812 he introduced to the stage the drama of "Timour the Tartar," which is said to have had much influence in creating a taste for gorgeous pageants. His best dramatic work is "The Castle Spectre." Lewis died at sea, on the 14th May, 1818. He is often called "Monk" Lewis.

LEWIS, SIR GEORGE CORNEWALL, BART., English statesman and author, was born in London, 21st April, 1806. He was the eldest son of Sir Thomas Frankland Lewis, who from 1821 to 1839 filled several important public offices—among them the vice-presidency of the Board of Trade and the chairmanship of the Poor-law Board. Sir George was educated at Eton and Christ Church, Oxford, where he graduated B.A. in 1828, as first class in classics and second in mathematics. Three years afterwards he was called to the bar at the Middle Temple, and after acting on various commissions of inquiry, he was appointed a poor-law commissioner, an office which he retained till 1847. Meanwhile he found time for the composition of several works, political and literary. In 1836 he published a disquisition on "Local Disturbances in Ireland, and the Irish Church Question;" and in 1839 two philological works, entitled "Glossary of Herefordshire Provincial Words," and an "Essay on the Origin and Formation of the Romance Languages." In 1841 he published a political "Essay on the Government of Dependencies." Entering Parliament as member for Herefordshire, in 1847, he became successively secretary to the Board of Control, under-secretary for the Home Department, and financial secretary to the Treasury, going out of office with the Whigs on the accession of Lord Derby to power in 1852. Before this time he had published two elaborate and argumentative works— one in 1849, "An Essay on the Influence of Authority in Matters of Opinion," and the other "A Treatise on the Methods of Observation and Reasoning in Politics." From July, 1852, to February, 1855, Sir G. C. Lewis was not only out of office,

but out of Parliament, having been defeated as a candidate for the representation of Herefordshire in the former month, and for that of Peterborough in the November following. In the meantime he became editor of the *Edinburgh Review*, and wrote his great work, "An Inquiry into the Credibility of the early Roman History," in which, impugning the reconstructive system of Niebuhr, he sought to disprove the credibility of the Roman history for the first 473 years of the city. Re-entering Parliament in March, 1855, as member for the Radnor boroughs, which he represented until his death, he resigned the editorship of the *Edinburgh Review*, and held the post of chancellor of the exchequer till the dissolution of Lord Palmerston's government in 1858. On the return of the Whigs to power in 1859, Sir George was appointed home secretary, an office which, to the surprise of the nation, he exchanged in 1861, on the death of Lord Herbert, for that of secretary of state for war. In the same year he published a work of much research, entitled the "Astronomy of the Ancients." His latest work was a "Dialogue on the Best Form of Government." Sir G. C. Lewis married, in 1841, Lady Maria Theresa Villiers, sister to the Earl of Clarendon; succeeded to the baronetcy on the death of his father in 1855; and died, from congestion of the lungs, on 13th April, 1863. A collection of his "Letters," edited by his brother, the Rev. Sir Gilbert Lewis, was published in 1870.

LEWIS, or THE LEWS, with **HARRIS**, the largest island of the Outer Hebrides, situated on the west coast of Scotland, and separated from the mainland by a channel called the Minch, 30 miles wide. Lewis belongs to the county of Ross, and Harris, a peninsula at the south end of the island, to the county of Inverness, but they have the same general features; length, N.N.E. to S.S.W., 50 miles; breadth, 28 miles; area, 147,221 acres. The surface is in general rugged, bare, and bleak, the only arable land being on the coasts, while the centre is chiefly wild moorland about 800 feet above the sea-level, with a longer slope eastward, and breaking more steeply down westwards. Lewis has high hills on the south-west and west, where it runs out into wild headlands. The greatest elevations are Measlabhal and Beinn Mhor, each 1759 feet high. Harris is in general more bare and mountainous. Grass is everywhere the prevailing rock, but the surface is chiefly covered with peat-bogs, which give it a very desolate appearance. The coast is bold, irregular, and greatly indented, and fringed with numerous small islands. Small lakes are very numerous, affording supplies of salmon and trout. Barley and potatoes are grown, and many cattle and sheep are reared. The soil is in general thin and poor, and agriculture is in a backward state; but great improvements have been introduced of late years. The climate is severe, the winter lasting from October till May, yet snow never falls in large quantities, owing to the insular position. Great storms from the west are of frequent occurrence. The inhabitants all speak Gaelic, and are chiefly Celts, though intermixed, especially in the north, with Scandinavians. They are short in stature, and, though living in much discomfort, and many in poverty, in badly constructed but most picturesque dwellings, are a highly moral people, robust, and capable of enduring great hardships. The capital is Stornoway, on the east coast. The Butt of Lewis is a cape at the north extremity of the island, 80 feet high. There is a lighthouse upon it; height of lantern, 160 feet. Lewis contains many objects of great interest to the archaeologist. In the north-west, near Uig, at Callernish, there is a grand group of standing stones on a plateau over Loch Roag, finer than anything in Great Britain, except the stennis of Orkney; in its vicinity are several circles of standing stones. On the road thence to Barvas there is a fine specimen of the old stone building called Piet's House or Broch, 40 feet in height. The population in 1881 was 25,487.

LEWISHAM, a village of England, in the county of Kent, 6 miles from Charing Cross Station, on the Tunbridge road. It is about a mile long, and has many handsome residences. The beautiful environs are covered with villas, and in the immediate vicinity is the Crystal Palace.

The manor of Lewisham belonged to the Abbey of St. Peter at Ghent, which had a priory here. Thomas, lord Seymour, husband of Queen Catharine Parr, held it till his execution, 1549, when it was given to John Dudley, duke of Northumberland, beheaded 1553, and after some further changes became the property of Admiral Legge, whose descendant, Lord Dartmouth, is the present owner. His eldest son is styled Lord Lewisham. There are several almshouses in the parish, among which Colfe's are the chief. Colfe's Grammar School was endowed by will in 1656, the Leathersellers' Company being the trustees.

LEWISIAN GNEISS is the name applied to the pre-Cambrian rocks of North-west Scotland, from their being largely developed in the island of Lewis; and they are also known as the fundamental gneiss, and sometimes as Laurentians. These rocks were noted at an early date by Macculloch and Hay Cunningham, but it was not till they were carefully examined by Sir R. Murchison that their true position at the base of the sedimentary system of Great Britain was determined. They consist of folded, highly-metamorphosed rocks with bands of crystalline limestone; they strike N.N.W. and are overlaid unconformably by the Cambrians of that district. No fossil remains of any kind have been found in them.

LEX MERCATORIA. See LAW-MERCHANT.

LEX TALIONIS. See TALIONIS LEX.

LEXINGTON, a town of the United States, the capital of Fayette County, and one of the most ancient settlements of the state of Kentucky, is situated on a tributary of the Kentucky River, nearly 80 miles south of Cincinnati. The town is well built, and the chief street is a mile and a quarter in length and 80 feet wide. There is considerable trade, and it is an important railway junction. Whisky, flour, ropes, and machinery are manufactured. It was the seat of the Transylvania University, incorporated in 1788, and the oldest institution of the kind in the western states. The State University was removed to Lexington and incorporated with it in 1865. There is a valuable library belonging to it, and also a public library, containing 15,000 volumes. The population in 1880 was 16,656. The town derived its name from a party of hunters, who first heard, while encamped on the spot where it stands, of the memorable engagement between the American and British troops at Lexington, in Massachusetts, in 1775.

LEYCESTERIA, a genus of plants of the order CARYOPHYLLACEÆ. The genus consists of only a single species, *Leycesteria formosa*, a native of the Himalaya Mountains, at elevations of from 6000 to 7000 and 8000 feet, in Nepal and Sirmore, where it grows among oaks and pines, and is therefore well suited to our climate, where indeed it may be seen growing in great luxuriance. The white flowers, tinged with purple, are arranged in terminal nodding spikes, and furnished with leafy coloured bracts. The berry is red. This is a beautiful shrub, the deep green of the stem and leaves contrasting well with the reddish bracts and berries. It may be propagated by cuttings. A light soil is most suitable.

LEYDEN, a city of the Netherlands, 22 miles south-west of Amsterdam, and 17 north from Rotterdam (with both of which it is connected by canals and railways), is situated on a branch of the Rhine, about 6 miles from the sea. The population in 1881 was 41,241. The town is traversed by many broad canals, which are bordered with trees, and which, intersecting each other, divide it into fifty small islands, connected together by 150 bridges. It is surrounded with a rampart, on which are fine shady walks; and outside there is a deep and broad moat, crossed

by eight bridges. The city is well built, and the principal streets are broad and well paved. The street in which the town-hall is situated extends nearly across the city from east to west; it is almost 2 miles in length, and was formerly considered one of the handsomest in Europe. The houses are mostly of brick, with the gable-ends to the streets. Among the public buildings the most worthy of notice are—the town-hall; St. Peter's Church, the finest of the seventeenth in the city; the great hospital; the arsenal, custom-house, and chamber of commerce. An ancient castle or fort, ascribed by tradition to the Romans, stands in the middle of the city, and commands an extensive prospect of the town and the surrounding country. The manufactures of linen and woollens have declined considerably, but are still the most important in Holland. Its principal trade is in grain, butter, and cheese. The most remarkable event in the history of Leyden is its successful resistance to the Spaniards in 1573, when it sustained a severe siege; it was ravaged by the plague in 1655, and was greatly injured by an explosion of gunpowder in 1807. The university was once the most celebrated in Europe, and has an extensive library of books and rare Oriental manuscripts, a valuable botanical garden, an observatory, a museum particularly rich in Japanese, Egyptian, and Etruscan antiquities, and a cabinet of natural history. The attendance of students is about 800. It was founded by the Prince of Orange, in 1575, to reward the inhabitants for their bravery, and as some compensation for the sufferings they sustained during the siege of the city by the Spaniards. The prince offered the inhabitants the remission of certain taxes or the establishment of a university, and they chose the latter. The great navigation school and the Remonstrant seminary were transferred from Amsterdam in 1873. There are, besides, several private museums, and many learned societies.

Leyden has given birth to some highly distinguished individuals. Rembrandt was born (in 1606) in its immediate vicinity; and it is the native place of Gerard Dou and other distinguished painters; and John Boheolt, better known as John of Leyden, founder of the Anabaptists.

LEYDEN JAR. See ELECTRICITY.

LEYDEN, LUCAS JACOBZ VAN (1494-1533), a fine engraver and painter in the ultra-realistic and painfully elaborated school of earlier Dutch art. The "Adoration of the Magi" at Buckingham Palace is the finest work of his that we have in this country.

LHA'SA. See LASSA.

LHERZOLITE is an ultra-basic rock. It consists of a granular or crystalline granular aggregate of olivine, enstatite, diopside, and picotite, the olivine being the chief constituent. It occurs in veins of limestone in the East Pyrenees, in the Tyrol, and in Norway. It derives its name from its occurrence at Lake Lherz.

L'HOPITAL or **L'HOSPITAL**, **MICHEL DE**, a celebrated French statesman, was born in 1565, near Aigueperse in Auvergne, and was the son of Jean de l'Hôpital, physician to the Constable de Bourbon. After practising for some time at the bar of the Parliament of Paris, his merit, added to his having married the daughter of the lieutenant-criminel Morin, procured for him a seat on the bench of the counsellors of the Parliament. The Duchess of Berri invited L'Hôpital to her court, and recommended him to Henry II., who appointed him superintendent of the finances. L'Hôpital endeavoured to check prodigality and corruption. He also opposed the persecution of the Protestants. On the death of the chancellor Olivier, in 1560, L'Hôpital succeeded him. He strenuously opposed the Cardinal de Lorraine, who wanted to establish the Inquisition in France; and his next thought was that of assembling the States-general, which had not met for eighty years, but the Guises opposed the proposal.

L'Hôpital accordingly contented himself with assembling the nobility and high clergy at Fontainebleau. The only useful result of the assembly was the passing of an ordinance prepared by L'Hôpital, which abolished arbitrary taxes, regulated the feudal authority of the nobles, and corrected many abuses in the judicial system. Soon after, July, 1561, L'Hôpital obtained from the regent Catherine an edict ordering the release of all prisoners suspected of heresy. By another edict Roman Catholics were forbidden, under pain of death, from forcing an entrance into the houses of Protestants under pretence of dispersing their meetings. After the death of the Duke of Guise, 1563, L'Hôpital prevailed upon Catherine to grant the edict "of peace," by which, among other conditions, all prisoners on both sides were released, and the Protestants were allowed the exercise of their religion within the towns which they had occupied during the war. He also prevailed upon Catherine to declare the majority of her son, Charles IX. L'Hôpital's opposition to the bull of the Pope, by which the king was authorized to levy 100,000 crowns a year on the revenues to root heresy from the kingdom, caused his downfall; the seals were taken from him, and he retired in 1568 to his country-house at Vignay, where he died 15th March, 1578.

LIAS is the lower member of the Jurassic system. In England it succeeds the Rhætic formation, and although in some cases it rests unconformably on older rocks, it most commonly rests quite conformably on the Penarth beds, which, though differing paleontologically, form a passage series between the Trias and it. These Rhætic or Penarth beds were formerly classed with the Lias as *White Lias*, but more recent research has shown that they possess a distinct fauna.

The Lias is overlaid conformably by the *Lower* or *Bath Oolite*, and there is a great similarity in the fossil remains, several species being common to both formations.

In the British Isles the Lias crops out as a broad band extending across England from the coast of Dorsetshire, north-west, to the mouth of the Tees, dipping east at a low angle; an offshoot occurs in South Wales; outlying patches lie at Brora and in the Hebrides, Scotland; at Carlisle; and beneath the basaltic plateau of Antrim, Ireland. The strata consist for the most part of beds of argillaceous limestone and calcareous clays, with sandy beds in some places; they often occur in very regular, uniform, and parallel layers, from which the formation derives its name, Lias—a provincial term signifying layers—which was applied to it in the district where William Smith examined and classified the Jurassic beds, and being retained by him it has been universally adopted.

The Lias is highly fossiliferous. The whole series of beds composing it lie perfectly conformably one with the other; but owing to lithological distinctions, and differences in the fossil remains, they have been separated into three divisions, each with its characteristic fossils, and capable of further subdivision into zones of characteristic ammonites.

The *Upper Lias* consists mostly of argillaceous strata. In the south of England this division is very thin, but it thickens considerably northward, and reaches a maximum development of about 800 feet. About Whitby, in Yorkshire, the pyritous shales were formerly much used for the manufacture of alum. Jet also is obtained from these shales; it is in most instances the fossilized stems of coniferous trees. The most characteristic fossil is *Ammonites serpentinus*. Belemnites, Nautili, and Lamellibranchs also abound. The characteristic ammonites are *Ammonites Jurensis* and *Ammonites communis*.

The *Middle Lias* or *Marlstone* is argillaceous below, but becomes more calcareous upwards; towards the top there are micaceous sands and clays with ferruginous limestones; its maximum development is 500 feet. In York-

shire there is in this subdivision a bed of earthy carbonate of iron, about 15 or 20 feet thick, extensively worked in the Cleveland district. *Spirifer Walcottii*, *Ammonites margaritatus*, and *Rhynchonella tetrahedra* are characteristic fossils, besides the following ammonites—*Ammonites spinatus*, *Ammonites annulatus*, *Ammonites Hendrii*.

The *Lower Lias* is the most largely developed member of this formation in England—maximum thickness, about 1000 feet. It consists of blue clays and argillaceous limestones, which are largely used for the manufacture of hydraulic lime. These beds form the base of the Lias; in Glamorganshire they rest on the upturned edges of the carboniferous limestone; in other places they are seen resting conformably on the *Acicula contorta* or Penarth beds. The beds of this division are highly fossiliferous, a very characteristic fossil being *Lima gigantea*; but other Mollusca, Cephalopoda, and Crinoids abound, besides large Reptilia. Some specially characteristic ammonites are *Ammonites raricostata*, *Ammonites oryctolus*, *Ammonites obtusus*, *Ammonites Turnerii*, *Ammonites Bucklandii*, and *Ammonites planorbis*. Insect remains, as Neuroptera, Coleoptera, and others, occur.

The fauna of the Lias is very numerous; its chief features have been noticed in the JURASSIC system. Crinoids, as *Elrætracrinus briareus*, are abundant. Ammonites and belemnites, among cephalopods, are very numerous. Among brachiopods the last of the Spirifers and Leptænas are found, as *Spirifer Walcottii* and *Leptæna Moorei*. Teeth and scales of fish are of frequent occurrence, but the most remarkable feature is the abundance of gigantic reptilian remains, such as the *Ichthyosaurus*, a fish-like beast of great size, having a short neck, large head, ossified eye-plates, and long jaws well armed with teeth. The *Plesiosaurus*, another large beast, had a long neck and small head. The *Pterodactyle* was a flying reptile with long jaws, the teeth inserted in separate sockets, ossified plates round the eyes, hollow bird-like bones, and the fifth digit prolonged for the support of a membrane similar to that of bats; these beasts were probably insectivorous. In the Lias of Yorkshire a true carnivorous crocodile, *Teleosaurus*, upwards of 18 feet in length, has been found.

In the west of Scotland the strata represent the shore line of the Liasic sea; and in the north of Ireland, at Portrush, the shales have become so indurated by the basalt as to resemble igneous rocks. At Brora there are estuarine beds and seams of coal.

LIBATION, a drink-offering. Libations were among the most graceful sacrifices of the ancients; and were used on all occasions of prayer and sacrifice, serving as a simple grace before or after meat as well as to wash in a triple stream the victim slain to sanctify a treaty. Those offered to the Furies were of water only; those offered to the gods of Olympus were usually of pure wine, very rarely of wine and water; but not unfrequently of honey and water, milk and water, &c., as well as of milk, &c., pure. Libations were always offered by the pious before drinking, that the gods might have their part in the good cheer. At every ordinary meal, as a sort of grace before meat, a few drops of wine from a full goblet were poured out upon the hearth as a sacrifice to the Lares. The Greeks used libations (*Gr. spondai*) as we do "toasts" at a banquet. After washing the hands with scented soap as they lay on their banquet-conches (*triklinia*), each sprinkled a few drops of wine as a libation, before the meal, and at its close a formal libation was drunk by all round to the "good spirit." Another "to each other's health" preceded the *symposion* or wine-feast with which formal banquets always concluded.

LIBAU, an increasingly important seaport town of Russia, in the government of Courland, situated on the Baltic, beside the Lake Libau, 105 miles west by south of

Mittau. It has cigar manufactories and machine works, and amber, which is largely thrown up by the sea here, is much worked; but the town is chiefly important for its shipping trade in flax, hemp-seed, linseed, and grain. The harbour, which is frozen only for a few weeks in the winter, will not admit large vessels, which are obliged to lie in the open roadstead. The town has good railway facilities with the interior. Population, 12,000.

LIBEL (from the Latin *libellus*, a little book) is a malicious defamation, expressed either in writing or by signs, pictures, &c., tending either to blacken the memory of one who is dead, or the representation of one who is alive, and thereby exposing him to public hatred, contempt, or ridicule. This species of defamation is usually termed *written scandal*, and it is generally treated as a more serious mode of defamation than **SLANDER**.

Whatever written words tend to render a man ridiculous or to lower him in the estimation of the world amount to a libel, although the very same expressions, if spoken, would not have been slander or defamation in the legal sense of those words. To complete the offence publication is necessary, that is, the communication of the libel to some person, either the person himself who is libelled, or any other. The mere writing of defamatory matter without publication is not an offence punishable by law; but if a libel in a man's handwriting is found, the proof is thrown upon him to show that he did not also publish it. Libellers may be punished by indictment or criminal information and by action. Indictment or criminal information is for the public offence (as it is termed), for every libel has a tendency to a breach of the peace by provoking the person libelled; the civil action, which is on the case, is to recover damages by the party for the injury caused to him by the libel.

The truth of a libel was formerly no justification in a criminal prosecution; yet it was so far considered an extenuation of the offence, that the Court of King's Bench would not grant a criminal information unless the prosecutor by affidavit distinctly and clearly denied the truth of the matters imputed to him, except in those cases where the prosecutor resided abroad, or where the imputations were so general and indefinite that they could not be expressly contradicted, or where the libel was a charge against the prosecutor for language held by him in Parliament. A fair report of judicial proceedings does not amount to a libel.

A petition containing scandalous matter, presented to Parliament or to a committee of either House, and legal proceedings of any kind, however scandalous the words used may be, do not amount to a libel. But if the petition were delivered to any one not being a member of Parliament, or the legal proceedings were commenced in a court not having jurisdiction of the cause, they would not be privileged. In the case of *Watson v. Walter*, the proprietor of the *Times* newspaper, tried in 1868, it was also decided that the reports of the debates of the Houses of Parliament were privileged, and that no action for libel could be sustained respecting them, unless they were unfair and inaccurate. Confidential communication reasonably called for by the occasion, as charges made by a master in giving the character of his servant to a party inquiring after it, or a warning by a person to another with whom he is connected in business, as to the credit or character of a third party about to deal with him, are considered as privileged communications, and are not deemed to be libels unless malice be proved, or the circumstances be such that malice may be inferred by the jury. In a civil action the question whether the publication is or is not a libel is decided by the judge or court. The punishment in a criminal prosecution may be fine and imprisonment.

The printer of a libel is liable to prosecution as well as the writer. The editor of a newspaper, or other person

concerned in the publication, or interested in the property thereof, may be compelled to disclose the name of the author of the libel, or of the name of any person connected with the publication.

The law of libel was considerably modified by the 44 & 45 Vict. c. 60, passed in 1881, the two chief sections of which were as follows:—

Any report published in any newspaper of the proceedings of a public meeting shall be privileged, if such meeting was lawfully convened for a lawful purpose and open to the public, if such report was fair and accurate, and published without malice, and if the publication of the matter complained of was for the public benefit, provided always that the protection intended to be afforded by this section shall not be available as a defence in any proceeding, if the plaintiff or prosecutor can show that the defendant has refused to insert in the newspaper in which the report complained of appeared, a reasonable letter or statement of explanation or contradiction, by or on behalf of such plaintiff or prosecutor.

No criminal prosecution shall be commenced against any proprietor, publisher, editor, or any person responsible for the publication of a newspaper for any libel published therein, without the written fiat or allowance of the director of public prosecutions in England, or her Majesty's attorney-general in Ireland, being first had and obtained.

In Scotland a libellous or defamatory attack upon a person's character or reputation may be the foundation of a criminal prosecution at the instance of the public prosecutor, or for a civil action for damages and reparation, which may now proceed before a jury. The amount of injury or loss suffered, actual or probable, and the insult or offence to the individual, are both to be considered in an action for damages on the ground of libel. Malice need not in general be averred, but it must be stated and proved in the case of actions of libel against persons who, from their position or duties, are privileged in interfering with the conduct and character of others. Members of Parliament, judges and counsel in courts of justice, and members of corporations, in inquiries relating to which the body has cognizance, have this privilege; but this is not extended to members of the General Assembly of the Church of Scotland, except when sitting as a court of justice. The press is free: but it is not entitled to animadvert upon the conduct and character of individuals, except in their public capacities. *Veritas contrivit*, or the truth of the statement complained of, is a good defence to a civil action of damages for libel, as tending to disprove the *implied* malice which is always presumed in such cases; but it is not a competent defence in a criminal prosecution. The term *libel* is also used in Scotch law to denote the form of complaint, or ground of charge, on which either a civil or a criminal action proceeds. The Act 44 & 45 Vict. c. 60 does not apply to Scotland.

LIBER, the inner bark of a plant, is a layer consisting of fibrous tissue, cellular substance, and laticiferous vessels, forming a compact zone immediately applied to the wood. The fibrous tissue of which it is composed quickly becomes thick-sided, by the addition of internal layers, the consequence of which is that such tissue is very tough. Hence it is usually from the liber that are extracted the fibres employed in making cordage or linen thread: this at least is its source in hemp, flax, the lime-tree, the lacc-bark, and many other dicotyledons which furnish thread; but in monocotyledons, which have no liber, as the cocconut, it is the ordinary woody bundles of the leaves, stem, and husks of the fruit from which the fibre used for ropes is procured. A new layer of liber is formed annually, contemporaneously with a new layer of wood; but the oak, the elm, and other plants increase their liber slowly and irregularly. As ancient books were written on the liber of the papyrus, the word *liber* in Latin came to mean book.

LIBERIA is the name of an independent negro republic of Western Africa, established in 1822, which extends along the coast of Guinea, between lat. $4^{\circ} 50'$ and $7^{\circ} N.$; lon. $7^{\circ} 35'$ and $12^{\circ} 20' W.$ Its sea-board extends 600 miles, including the colony of Cape Palmas, with an average breadth of 100 miles. The area is about 23,000 square miles. The inhabitants belong to all nationalities of Africa, and were computed in 1885 to number altogether 770,000. The establishment of Liberia is due to the Americans. In 1816 the American Colonization Society was established at Washington for the purpose of founding a colony of emancipated negroes. The first attempt to carry out their idea proved unsuccessful, in consequence of the unhealthiness of the site chosen; but in 1822 they purchased Cape Mesurado, upon which Monrovia, the capital (so called from President Monroe), now stands. Purchases of other territory were subsequently made, and in 1839 the several settlements were united as a commonwealth. In 1817 this gave place, with the desire of the settlers, and with the consent of the Colonization Society, to the present republic of Liberia. The state was first acknowledged by England (whose government made it a present of a corvette of war with four guns, its only navy), afterwards by France (who supplied its 1500 militia with muskets), Belgium, Prussia, Brazil, Denmark, and Portugal, and, in 1861, by the United States. The republic has the facility of almost indefinite extension into the interior. It is stated that the natives everywhere manifest the greatest desire that treaties should be formed with them, so that the limits of the republic may be extended over all the neighbouring districts. The Liberian territory has been acquired by more than twenty treaties, and in all cases the natives have freely parted with their titles for a satisfactory price. The chief solicitude has been to purchase the line of sea-coast, so as to connect the different settlements under one government, and to exclude the slave trade, which formerly was most extensively carried on at Cape Mesurado, Tradetown, Little Bassa, Digby, New Sesters, Gallinas, and other places at present within the republic. Many of the natives have become useful citizens, serve on juries, act as magistrates, and one of them has been elected and serves creditably as a member of the Liberian House of Representatives.

The constitution of the republic of Liberia is on the model of that of the United States of America. The executive is vested in a president and a non-active vice-president, and the legislative power is exercised by a Parliament of two houses, called the Senate and the House of Representatives. The president and vice-president are elected for two years; the House of Representatives also for two years, and the Senate for four years. There are thirteen members of the Lower House, and eight of the Upper House; each county sending two members to the Senate. Every man above twenty-one years of age, who possesses a real estate of the value of 30 dollars, has a vote; and it is provided that, on the increase of the population, each 10,000 persons will be entitled to an additional representative. Both the president and the vice-president must be at least thirty-five years of age, and possess real property to the value of 600 dollars, or £120. In case of the absence or death of the president, his post is filled by the vice-president.

For political and judicial purposes, the republic is divided into four counties, called Montserrado, Grand Bassa, Sinoe, and Maryland, which are further subdivided into townships. The townships are commonly about 8 miles in extent. Each town is a corporation, its affairs being managed by officers chosen by the inhabitants. Courts of monthly and quarter sessions are held in each county, whose civil business is administered by four superintendents appointed by the president with the consent of the senate. The county

system of government is capable of indefinite extension over new districts of territory that may be acquired, giving to the inhabitants all the advantages which local self-government affords. The government of Liberia is entirely in the hands of the African race.

English is the official language, and is spoken by the negroes from the United States. All are Protestants, popery being proscribed. There is a good supply of churches, and a system of common-school instruction is provided by the government. Several institutions of a more advanced character are supported by the benevolence of the American people. A college, erected at a cost of 20,000 dollars, is open at Monrovia, having a faculty of three (coloured) professors and about twenty-five students. Newspapers are published, and there is a regular postal system. In general, those who migrate from America are despatched into the interior, where the soil is better and the climate more healthy than on the coast. Carysburg, White Plains, and other stations, have been thus established. The public revenue and expenditure each amount to rather more than £30,000 per annum. The Liberians have built and manned thirty coast traders, and they have a number of large vessels engaged in commerce with Great Britain and the United States. Systematic drainage and clearing the woods have greatly improved the climate.

Palm-oil, camphor, ivory, gold-dust, coffee, indigo, ginger, arrow-root, and hides are exported. Cocoa and sugar thrive, and recently cotton has been grown. Mandingoes, horses and native cattle are used for draught, but much of the camwood exported is brought 200 miles from the interior on men's backs. It is estimated that 2,000,000 of the inhabitants of the interior now obtain supplies of European goods from the republic and Cape Palmas; and that the Liberians exercise Christian influence over 750,000 natives. In 1871 the republic laid the foundation of a public debt by contracting a loan of 500,000 dollars, or £100,000 at 7 per cent. interest, to be redeemed in fifteen years. The loan was issued in England, but no interest has been paid since 1871, the government of the republic being actually bankrupt. The church of Liberia was reorganized in 1862. The seaport is Monrovia. The other chief settlements are Bexley, Edina, and Cresson—the latter situated on a fine bay, and affording abundant supplies of wood and water. Edina is named after Edinburgh, from which city considerable pecuniary aid was sent to Liberia in 1834. The success of Liberia is doubtful, but it has often been adduced by the friends of the negroes as a proof that they are thoroughly capable of self-government under fair and proper conditions.

LIBERTINUS. In the Roman polity persons were divided, with respect to status or condition, into freemen (*liberi*) and slaves (*servi*). Freemen, again, were divided into persons who were born in a state of freedom (*ingenui*) and *libertini*, or those who had been manumitted. A manumitted slave was called *libertus*, that is, *liberatus*, "freed," with reference to the act of manumission, and to his master, who, by manumitting him, became his patron (*patronus*): he was called *libertinus* with reference to the class to which, by the act of manumission, he belonged.

LIBERTY and NECESSITY. See FREEDOM OF THE WILL.

LI' BRA (the Balance). In the older Greek writers the Scorpion occupies two constellations of the ZODIAC, or rather the body of the animal occupies one, and the claws, *chelæ* (χελαι), another. We say this because, though the chelæ were certainly a part of the Scorpion, yet they are often mentioned (as by Aratus, for instance) by themselves, as if they formed a distinct constellation. The word *chela* had several significations; so that it may have been by simple mistranslation that the Romans (according to Hyginus, Virgil, &c.) gave the name of *Libra* to the part of the heavens in question, and drew back the claws of the Scorpion to make room for the scales of the Balance.

Libra is surrounded by Scorpio, Ophiuchus, Virgo, Centaurus, and Lupus. See PLATE CONSTELLATIONS, Southern Hemisphere, on the Zodiac, opposite the figure xv.

LIBRA, among the Romans, a pound weight, equivalent to the *as*, or 12 oz. It was also the name of a coin consisting of 12 oz. of silver, or 96 drachme, worth about £3. The French *livre* ("pound weight," not "book;" the latter is from *LINER*) and the Italian *libra* come from this word.

LIBRARIES. The word library signifies a collection of books arranged for use, and also the building or apartment in which such collection may be kept. The term is sometimes applied to a series of works uniformly printed on a single or on several subjects, such as the "Library of Old Authors," &c.

In ancient times it is easy to suppose that when books began to be multiplied libraries would be founded, not only for purposes of study, but for the preservation of archives and other documents, which a barbarous system of warfare rendered it desirable should be kept in places of great security. According to Diodorus Siculus (l. 58) Osymandias, king of Egypt, had a library built in his palace with this inscription above the door, *Ψυχῆς λαρύνη* (the dispensary of the mind), and sculptures on the walls representing "a judge with the image of truth hanging from his neck, and many books lying before him." What adds to the interest of this statement of Diodorus is the circumstance, that by recent discoveries in Egypt this building has been identified as the *Memnonium*.

Among the discoveries of Layard at Kouyunjik was a chamber filled with clay tablets, the inscriptions on which furnish us with quite a body of ancient literature of every class. There are tablets of a geographical, statistical, mathematical, devotional, and poetical nature, as well as lists of plants, minerals, and animals known to the Assyrians. Taken together they tend to throw singular light upon the faith and literature of the early dwellers in Babylon and Assyria. The chamber has been called the Royal Library of Assurbanipal, and it is certainly here we meet with the first "librarian." He is found referred to as the "man of the written tablets," and was a Babylonian named Amel-annu, who lived in the reign of Ernugsin, about sixteen centuries B.C.

The most famous library of Egypt, perhaps of the ancient world, was founded at Alexandria by Ptolemy Soter, about 290 years B.C. No expense was spared on the collection, which at length amounted to 500,000 volumes. After subsisting for 244 years, it was burned during the expedition of Cæsar to Egypt. Another collection existed at Alexandria till 640 A.D., when it shared the same fate.

Among the Greeks libraries were numerous. Peisistratos founded a library at Athens, which, after undergoing many vicissitudes, subsisted till the time of Hadrian. Polykrates founded one at Samos, and large collections of books were made by Euclid, Euripides, and especially by Aristotle, whose library was purchased by Ptolemy and incorporated with the Alexandrian. There was also a famous library at Pergamus, founded by Eumenès, which, according to Plutarch, contained 200,000 volumes.

The first library at Rome was that of Æmilius Paulus (167 B.C.), the contents of which had been carried off from Macedonia. The most celebrated were the Octavian and Palatine public libraries, established by Augustus, the latter of which continued until the time of Pope Gregory I.; the Ulpian library, erected in his noble Forum by the Emperor Trajan (Ulpian Trajanus); besides others in the principal cities and colonies of the empire. In the fourth century there were twenty-eight public libraries in Rome; and the number of calcined volumes found at Herculaneum and Pompeii prove that collections of books were common in those cities.

Constantine erected at Byzantium, or Constantinople, a magnificent library, which under his successors reached the number of 200,000 volumes. It remained till the seventh century, when it was burnt by command of the Emperor Leo III.

During the Middle Ages the Moslems had an important library of Arabic books in Alexandria, and one at Bagdad, which included Greek MSS. In Spain they had seventy public libraries in the twelfth century, and that at Cordova contained 250,000 volumes. In the West libraries were attached to nearly every large church, while the Benedictine, Franciscan, and other monks, collected in their religious houses many volumes, which at the Reformation were dispersed, and found their way into the libraries of universities, cities, and princes.

The invention of printing brought about a new era in the history of libraries, the number of books being greatly increased. Shortly after this may be dated the foundation of several of the more famous libraries of Europe, a list of which is subjoined.

England possesses many ancient private libraries, among the more important of which may be mentioned those of Earl Spencer, at Althorp; the Earl of Ellesmere, at Bridgewater House; the Duke of Devonshire, at Chatsworth; Sir Thomas Phillipps, at Middlehill, Worcestershire; the Earl of Leicester, at Holkham; and Lord Ashburnham, whose library contains a fine collection of MSS. Among the Scottish private libraries may be mentioned those of the Duke of Buccleuch, at Dalkeith and Bowhill; the Marquis of Lothian, at Newbattle; the Earl of Dalhousie, at Brechin Castle.

Under the Public Libraries Act, passed at various times from 1850 to 1871, the ratepayers of any town in the United Kingdom may now determine by a majority to establish a free public library at the cost of the local rates. About 100 towns have availed themselves of these provisions.

The figures on the next page are as correct as possible, but not in every case fairly comparative. The St. Petersburg library, for instance, is said to bind up every pamphlet as a separate volume; and the specifications of British patents would there be reckoned as an accession of between 3000 and 4000 volumes, while at the British Museum they would be counted as less than 100 volumes. No account is here taken of the libraries in possession of each of our various cathedrals, nor of school libraries, although the latter undoubtedly exert a very important influence on the nation. In America the aggregate number of books in Sunday and day school and college libraries is estimated at 12,000,000; and in the United Kingdom the corresponding total would probably be fully equal. Paris, it will be observed, is very abundantly supplied with libraries, there being others in that city, containing about 70,000 volumes, not specified below. The 1,500,000 volumes of the National Library, however, do not represent a normal growth. It has often been enriched by the spoils of war and the ruin of provincial libraries. The foundation of the Imperial Library at St. Petersburg was due to the confiscation of the celebrated Zaluski Library at the fall of Warsaw in 1794. The Vatican was long supposed to possess the largest library in Europe, but recent research shows quite the contrary. Its very valuable MSS., however, will ever give it an important place among the libraries of the world. The most remarkable instance of rapid growth is that of the Strasburg library. The old library was destroyed in 1870 during the bombardment of the town, and there perished hundreds of thousands of books and MSS., which could never be replaced. After the war, however, the Germans went to work to found another library with such goodwill, that five years sufficed to bring together more than 350,000 volumes. The British Museum Library increases

by 80,000 a year, a rate of progression without a parallel. Its MS. catalogue of printed books fills nearly 200 volumes. China and Japan have also libraries, those of the latter country being of course modelled on European views, and are made of good practical utility. Sir John Bowring, after an immense amount of trouble, gained admission to the Chinese library at Ningpo, and from his own words we may infer to what extent it is made available for the public use:—"I entered the library; there were hundreds of thousands of volumes, but there was not a single reader, and it was not in the memory of men that a single book had been allowed to depart from the rooms!"

The following tables show, as nearly as could be ascertained in 1885, the extent of the principal libraries of Great Britain, Europe, and America:—

GREAT BRITAIN.

	Name.	Founded.	Printed Vols.	MSS.
ENGLAND.				
Birmingham.	Free Public, . . .	—	100,000	—
Cambridge, . .	University, . . .	1175	216,000	3,000
"	Trinity College, .	—	46,000	—
"	St. John's, . . .	1530	29,000	—
"	Queen's, . . .	—	28,000	—
"	Gonville, . . .	—	16,500	700
"	Emmanuel, . . .	—	20,000	—
"	Pembroke, . . .	—	12,500	—
"	Peterhouse, . . .	—	8,500	—
Liverpool, . .	Free Public, . . .	1852	100,000	—
London, . . .	Guildhall Free, .	—	40,000	—
"	British Museum, .	1753	1,250,000	52,000
"	London Institution, .	1805	65,000	—
"	" Subscription, . .	1841	68,000	—
"	Royal Society, . .	1667	44,000	—
"	Slon College, . . .	1611	43,000	—
"	Lincoln's Inn, . .	1522	30,000	900
"	R. Institution, . .	1803	30,000	—
"	Lambeth, . . .	1610	28,000	1,200
"	Middle Temple, . .	1641	23,000	—
"	Inner Temple, . .	1767	18,000	500
Manchester, . .	Free Public, . . .	1852	110,000	—
"	Chetham's, . . .	1653	19,000	137
Oxford, . . .	Bodleian, . . .	1567	450,000	30,000
"	Ashmolean, . . .	1683	1,800	—
"	Radcliffe, . . .	1749	25,000	—
Salford, . . .	" . . .	1850	20,000	—
SCOTLAND.				
Aberdeen, . .	University, . . .	1634	52,000	174
Edinburgh, . .	Advocates', . . .	1680	225,000	2,000
"	University, . . .	1580	135,000	700
"	Signet, . . .	1790	55,000	100
"	R. Coll. of Phys., .	1682	16,500	50
"	Medical Society, .	1737	16,500	—
"	Free College, . . .	1843	48,000	—
Glasgow, . . .	University, and . .	1473	120,000	242
"	Hunterian Museum	1781	—	—
"	Stirling's, . . .	1791	60,000	—
"	Mitchell's, . . .	1874	35,000	—
St. Andrew's, .	University, . . .	1600	65,000	63
IRELAND.				
Dublin, . . .	Trinity College, .	1602	130,000	1,600
"	King's Inn, . . .	1787	33,000	150
"	Dublin Society, . .	1731	28,000	—
"	Archbp. Marsh's, .	1697	20,000	193
"	Irish Academy, . .	1787	12,000	500
EUROPE.				
Paris, . . .	National, . . .	1373	1,500,000	80,000
"	Arsenal, . . .	1781	205,000	6,000
"	Gonovievo, . . .	1624	188,000	3,500
"	Mazarin, . . .	1600	135,000	3,000
Munich, . . .	Royal, . . .	1550	600,000	22,000
"	University, . . .	—	220,000	2,000
Berlin, . . .	Royal, . . .	1661	600,000	14,000
Vienna, . . .	Imperial, . . .	1440	385,000	20,000
"	University, . . .	1777	125,000	—
Dresden, . . .	Royal, . . .	1555	306,000	2,800

	Name.	Founded.	Printed Vols.	MSS.
Gottingen, . .	University, . . .	1736	360,000	5,000
Wolfenbuttel, .	Ducal, . . .	1604	200,000	6,000
Tübingen, . . .	University, . . .	—	215,000	2,000
Stuttgart, . . .	Royal, . . .	1765	245,000	3,200
Leipzig, . . .	University, . . .	1543	150,000	2,500
Hamburg, . . .	Town, . . .	1522	250,000	5,000
Gotha, . . .	Ducal, . . .	1640	150,000	5,000
Darmstadt, . .	Grand Ducal, . .	1760	230,000	4,000
Heidelberg, . .	University, . . .	1763	200,000	2,250
Prague, . . .	University, . . .	1350	150,000	4,000
Breslau, . . .	Royal University, .	1811	350,000	2,300
Hanover, . . .	Royal, . . .	1630	135,000	—
Strassburg, . .	University, . . .	1571	300,000	—
Pesth, . . .	National, . . .	—	190,000	10,000
Brussels, . . .	Royal, . . .	1350	234,000	2,000
"	Town, . . .	1837	128,000	1,500
The Hague, . .	Royal, . . .	1795	112,000	2,000
Rome, . . .	Vatican, . . .	1450	100,000	24,000
"	Casanata, . . .	—	120,000	4,500
Bologna, . . .	University, . . .	1690	156,000	11,000
Naples, . . .	Royal, . . .	1790	200,000	4,000
Venice, . . .	St. Mark's, . . .	1468	115,000	10,000
Florence, . . .	Magliabecchian, .	1714	175,000	12,000
"	Laurentian, . . .	1444	125,000	6,000
Milan, . . .	Brera, . . .	1763	128,000	1,000
Madrid, . . .	Royal, . . .	1712	200,000	2,800
St. Petersburg, .	Imperial, . . .	1747	800,000	20,000
"	Academy, . . .	1726	120,000	—
Warsaw, . . .	University, . . .	—	150,000	—
Copenhagen, . .	Royal, . . .	1550	550,000	25,000
"	University, . . .	1731	154,000	4,000
Upsal, . . .	University, . . .	1621	140,000	7,000
Christiania, . .	University, . . .	1811	130,000	600

AMERICA.

Washington, . .	Congress, . . .	—	300,000	—
"	Smithsonian Inst.	1849	35,000	—
Boston, . . .	City, . . .	1833	300,000	—
"	Athenæum, . . .	1804	100,000	—
New York, . . .	Astor, . . .	1839	160,000	—
Albany, . . .	State, . . .	1818	75,000	—
Philadelphia, . .	Library Company, .	1731	70,000	—
"	Acad. of Nat. Scs., .	1812	30,000	—
Charleston, . .	Library Society, . .	1748	30,000	—

Library Economy.—This subject embraces all matters relating to the construction and management of libraries designed for the use of the public.

That a collection of books may deserve the name of a public library, it must be classed according to some system, and arranged for easy reference. A library, whether public or private, whether it contains a million or only a few hundred volumes, will only be useful so long as it is arranged and managed according to a plan in harmony with its purposes.

The more important matters pertaining to this subject may be shortly treated of as follows:—

1. *Furniture.*—The most suitable height for library bookcases is from 8 to 10 feet, and if the apartment be lofty a light gallery of perforated iron, accessible by a small spiral staircase, may be continued above the first row of cases, with a light balcony in which a second set of cases may be placed. The shelves in these cases should commence about 3 or 4 inches from the floor, and may be placed at the following distances from each other:—Folios, 16 to 18 inches; 4tos, 10 to 11 inches; 8vos, 8 inches; 12mos, 7 inches. Their depth should be about 15 inches, to allow the circulation of air. It is also necessary to know the sizes suitable for the reception of various classes of works. For instance, the fathers of the church, Bibles, the councils, and schoolmen require more space for folios than for 4tos or 8vos; the belles-lettres, again, require in general only shelves of the height for 8vos or 12mos; natural history, geography, travels, antiquities, architecture, furnish 4tos and 8vos in equal proportions, but

require a special place for the atlases ordinarily accompanying such works.

Ladders should be substantial, but light enough to facilitate their continual shifting. Oak is preferable to all other wood for library furniture, as it is less liable to the attacks of worms, and is easily kept clean.

2. *The Classification of the Books.*—Many systems of classification have been proposed. The most convenient, however, is that of Mr. Hartwell Horne, modified from the one originally proposed in France by Father Garnier, in 1678. It is as follows:—(1) Theology; (2) Jurisprudence; (3) Philosophy; (4) Arts and Trades; (5) History; (6) Literature.

Under these comprehensive divisions books of every kind may be classified, and the numbering and marking of the volumes may be made in accordance with them. The six divisions may be denoted by the letters A, B, C, D, E, F; each of these may have twenty-six subdivisions, Ea, Eb, Ec, to Ez; these again may have twenty-six subdivisions, Ea+, EaΔ, Ea†, and so on to almost any extent: for example, the first volume of "The History of Europe," by Sir A. Alison, twenty vols. 8vo (Edinburgh, 1874), would bear the mark—

Eh	{ E. Class <i>History</i> .
+	{ h. Division <i>Modern History</i> .
9514	+ Subdivision <i>History of Europe</i> .
	9514, No. of Books in 8vo.
1	1, No. of Volume.
	8vo size.

In the British Museum, and some other large libraries, a system of arrangement called the *expansive* has been adopted. The library is divided into presses, each of which has a number; the shelves of each press are distinguished by a letter of the alphabet, and the place of each book on a shelf is indicated by a number; thus 573 c 13, means the thirteenth book on the third or c shelf of press 573. The numbers of the presses, however, are not in immediate sequence—thus, supposing the first press to be numbered 1, and the works under the class theology to occupy two presses, twenty numbers would nevertheless be allotted to this class. The first three numbers of the presses would then be 1, 2, 20. When a third press should come to be required for theological works, instead of placing them in another part of the library, the books in the press marked 20, together with its number, would be moved on to the next press, and the press occupied by No. 20 would be called No. 3. By this process all the works belonging to one class are kept together for a longer period than under other systems. This arrangement, however, involves two indispensable conditions—viz. sufficient space, and that all the presses should be exactly of the same size.

3. *Catalogues.*—The catalogue of a large library should contain the transcription of the titles of the books in the following order:—The name of the author, the exact title, with the name of the editor or annotator, the number of volumes, the size, the name of the town where published, with the name of the publisher and printer, and the date. In addition, each entry in the catalogue should have the distinctive letters of the class and division to which the work described belongs, and also the running number in the library arrangement.

Besides the general catalogue, which should be constructed according to the authors' names in alphabetical order, there should also be shelf catalogues, or lists of the contents of a library shelf by shelf. These last are useful, when the books themselves are carefully classified, as furnishing to some extent a *catalogue raisonné* of a library.

4. *Stamping, Binding, &c.*—In every large library the stamping or marking of the books is an important matter.

This should be applied at the beginning and end, and also on a certain leaf on the middle of each volume (in the Royal Library of Paris it is the 101st). Each plate and map should also be stamped, but in such a way as not to be injured. The binding of the books [see *BOOKBINDING*] should in every case be made suitable to the importance and value of the books.

5. *Classification of Manuscripts, Prints, and Coins.*—Many libraries contain, besides books, collections of manuscripts, prints, and coins. The first may be arranged according to the six divisions indicated above, s. 3. For the classification of prints the twelve following heads may be adopted:—

1. Sculpture, architecture.
2. Religion, morals, sacred emblems, and devices.
3. Fiction, Greek and Roman antiquities, &c.
4. Genealogy, chronology, heraldry, coins, numismatics.
5. Public festivals, cavalcades, tournaments, and carousals.
6. Geometry, machines, mathematics, military art, music, arts and trades.
7. Romances, facetiæ, buffooneries, caricatures.
8. Natural history, anatomy.
9. Geographical and historical maps.
10. Ancient and modern monuments, and topography.
11. Portraits.
12. Fashions, costumes, manners.

Each class is divided into schools, and each school into its masters.

For coins, the following is the classification adopted in the principal cabinets of Europe:—

1. Ancient coins of (1) kings, (2) cities, (3) Roman families (consular), (4) emperors, (5) deities, heroes, and illustrious men.
2. Modern coins of (1) Europe, (2) other parts of the world, (3) tokens.

Each series may be divided into gold, silver, bronze.

For full details of the matters which fall to be treated of with regard to libraries in general, see Edwards' "Memoirs of Libraries" (two vols. 8vo, published in 1859), which is the best work on this interesting subject.

LIBRARIES, MILITARY. For several years past a sum of £1000 or £5000 has annually figured in the army estimates of Great Britain for supplying and maintaining our troops with libraries. Military libraries are of two kinds, *garrison* and *regimental*. The former comprises a large collection of books, with newspapers, games, and a commodious reading and lecture room; and the latter merely collections of books, which accompany regiments in their various movements from place to place in times of peace. The introduction of these libraries has been found to improve the *morale* without injuring the efficiency of our soldiers.

LIBRATION (Lat. *libratio*, from *libra*, a balance), a balancing motion, in which there is a position on one side and the other of which a body vibrates—being, in fact, the same in meaning as oscillation. This term is, however, particularly applied to a small irregularity, compounded of the moon's rotation round her axis and her orbital motion, by means of which her visible hemisphere is not always quite the same.

The mean revolution of the moon round her axis is the same period of time as her mean revolution in her orbit. If both motions were equable, the moon would always present the same face to a spectator placed at the centre of the earth, on condition that the plane of her equator passed through the centre of the earth. None of these conditions being exactly fulfilled, and the variations being small and periodic, the consequence is that a small portion of the moon's surface at the eastern and western limbs (edges), and also at the northern and southern limbs, is alternately visible and invisible.

LIBRET TO (Ital., little book), a term specially now limited to the words which serve as the basis for an opera. The difficulties of writing a libretto which shall be both dramatically and musically satisfactory are so great that in not more than a dozen instances perhaps have they been effectually surmounted. Really great poets and dramatists refuse to busy themselves with words which the musician repeats or cuts short as he chooses, and with situations which have to be contrived so that the requisite voices may be brought together for the requisite concerted pieces, no matter by what absurd means. Libretti, as a rule, are therefore provided by inferior men, and it is astonishing what inane rubbish disgraces the musical stage. Mendelssohn meant to do something in this matter, Berlioz really accomplished a little improvement, but it was Wagner who made the great stride in the right direction, insisting that the meaning, and indeed the music, of the words was to be in the future held of as great account in the music-drama as the meaning and melody of the tones themselves. The day when the finest music of the stage has been written to such libretti as those of "Il Don Giovanni" and "Il Flauto Magico" is indeed, let us hope, for ever past.

LIB'YA, the western side of the Nile-land with the ancients; hence also the interior of Africa generally, and, in fact, especially among the Greeks (Libyē), the name for the entire continent of Africa. The Libyan desert is on the westward of the Nile, the Syrian (or Arabian) desert on the eastward.

LIB'YAN DESERT, a part of the Sahara or Great Desert, with Tripoli on the north, Egypt on the east, Darfar on the south, and Fezzan on the west, 1000 miles by 550. It consists of immense sandy tracts, sloping gradually towards the Mediterranean.

LICENSES are grants of permission by the state, allowing subjects to vend or deal in excisable articles, to possess certain specified things, as horses, dogs, guns, &c., and to exercise various callings, from which the country derives a revenue. Most of these are described in the various articles to which they refer, such as AUCTIONEER, GAME LAWS. Formerly the charge for permission to keep carriages, man-servants, &c., were treated as assessed taxes, but they are now classed under the head of licenses.

LICHENIN, a kind of starch found in lichens, especially in *Cetraria islandica*, or Iceland moss. It is insoluble in cold water, alcohol, and ether. When boiled with water it dissolves, and the solution gelatinizes on cooling, forming the Iceland-moss jelly used for dietetic purposes. The plant also contains a bitter principle (cetraric acid), which should be first removed by macerating it for twenty-four hours in cold water containing a little carbonate of soda. The formula of lichenin is $C_{12}H_{16}O_5$. It is converted into glucose by dilute acids the same as starch, from which it differs in giving no blue colour with iodine. This lichen also contains a fatty acid called lichen stearic acid ($C_{14}H_{24}O_2$). It crystallizes in pearly scales, melting at 248° Fahr. It is insoluble in water, but soluble in alcohol, ether, and oils.

LICHENS are a group of plants belonging to the **CRYPTOGAMS**. By some botanists they are considered to be intermediate between *Algæ* and *Fungi*, while others support the theory of Schwendener, that they are true *Fungi*, but distinguished by a singular parasitism on certain *Algæ*. A lichen consists of a vegetative portion (*thallus*), and of reproductive bodies contained in the *apothecium* and *spermogonium*. The thallus is of very various forms, sometimes occurring as encrustations on the surface of rocks or trees, or between the bark layers, with the fructification appearing at the surface; these are called *crustaceous lichens*. (See **LICHENS**, Plate II. 3.) They are connected by intermediate kinds with the forms which have flake-like expansions, either rounded or lobed and cut; these are the *foliaceous lichens* (Plate I. 1, II. 2). Other forms are attached at a single spot, from which branches rise with

some resemblance to a miniature shrub; they are known as *fruticose lichens* (Plate I. 8, II. 10). The thallus is generally of a gray colour and of a leathery consistence, but some lichens are gelatinous (e.g. *Collema*, Plate I. 3). The internal structure generally consists of layers—a cortical layer on the outer surface, formed of small cells; a gonidial layer below this, with green globular cells (the *gonidia*); and followed by the medullary layer, consisting of interlacing threads. In a few lichens, such as *Collema*, there is no stratification, the gonidia lying either singly or in strings among the interlacing threads. Granular matter, together with gonidia and threads, are often protruded through the cortical layer; these rounded masses are called *soredia*. The apothecium or female portion is either *gymnocarpous*, disc-shaped and open on the surface, as the large discs of *Urenea florida* (Plate I. 8), or *angiocarpous*, inclosed sometimes with, and sometimes without, an opening. The disc-shaped apothecia are of various kinds, and as the distinctions are of value in classification the forms have received special names—viz. (1) *pulvate*, when they are large, flat, round, without any distinct margin, e.g. *Urenea* (Plate I. 8); (2) *lecanorine*, when they are like those in *Lecanora* (Plate II. 6, 11), rounded, and with a distinct prominent margin, formed from the thallus; (3) *lecidine*, like those in *Lecidea* (Plate II. 3, 5), rounded, and with its own proper margin—this margin is sometimes gyrose, as in *Gyrophora* (Plate II. 9), or stipitate, as in *Bæomyces* (Plate II. 8); (4) *lirelliform*, furrow-shaped and irregular, as in *Graphis* (Plate I. 2). The colour of the apothecia is generally of a different colour from the thallus (*discolorous*), occasionally it is of the same colour (*concolorous*). Lecideine apothecia, which are variously coloured, but not black, are called *biatorine*. The apothecia contain the spores, which are inclosed in elongated cells called *thece*. The spores are the reproductive bodies of lichens; they are sometimes simple, sometimes divided by partitions; they are of various forms, and vary in number in the thece of different species. Their characters are constant in the same species, and are therefore of great value in distinguishing species. The thece are surrounded by closely-packed threads called *paraphyses*; these, by their pressure, aid in the expulsion of the ripe spores.

The spermogones contain long cells called *sterigmata*. The end of each cell is at length divided off by a partition. The cells thus formed are called *spermatia*; they are at first minute, but afterwards lengthen, become detached, and, by the absorption of water in the spermogone, are finally expelled. They also have characters useful in the discrimination of species.

Lichens are used to some extent in the arts, though not so much as formerly. From *Archil* (Plate II. 4) a purple dye is obtained, from Cudbear (Plate II. 11) a scarlet colour, and also, by the addition of certain alkalies, a blue dye. Several other lichens also supply colouring matter. Iceland-moss (Plate I. 5) supplies nourishment to the poor in the inhospitable regions of Iceland. Reindeer-moss (Plate I. 7) is the only food for the reindeer during the long winter months. The Tripe de Roche (Plate II. 9) is used in the Arctic regions of North America when no other food is available. In the deserts of Northern Africa and Central Asia the Manna Lichen (*Lecanora esculenta*) occurs lying some inches thick over great distances.

The classification of lichens by Nylander is that now generally adopted by lichenologists; the following is an outline of it:—

FAMILY I. Ephebacii.—Thallus but little swollen when moist, gonidia involved in a gelatinous layer of cells, medullary threads none.

FAMILY II. Collema.—Thallus swollen when moist, gonidia arranged like strings of beads, medulla not distinct. Example, *Collema* (Plate I. 3).

FAMILY III. Lichenacei.—Thallus not gelatinous, with a gonidial layer; medullary layer more or less distinct.

Series 1. Epiconioidi.—Apothecia, with the spores usually naked and powdery on the surface of the fructification. Examples, *Calicium* (Plate I. 6), *Sphaerophoron* (Plate I. 11).

Series 2. Cladodei.—Apothecia generally stalked, biatorine, or rarely lecanorine. Examples, *Bacomyces* (Plate II. 8), *Cenomyces* (Plate I. 7, 9).

Series 3. Ramalodei.—Thallus fruticose or thread-like, not leafy; apothecia generally lecanorine. Examples, *Roccella* (Plate II. 4), *Ramalina* (Plate II. 10), *Usnea* (Plate I. 8, II. 7), *Cetraria* (Plate I. 5).

Series 4. Phylloidei.—Thallus leafy, usually depressed, lobed; apothecia generally peltiform or lecanorine. Examples, *Parmelia* (Plate I. 1), *Stictia* (Plate II. 2), *Ricasolia* (Plate I. 12), *Peltidea* (Plate I. 10), *Solorina* (Plate II. 1), *Gyrophora* (Plate II. 9).

Series 5. Placodei.—Thallus variously crustaceous; apothecia lecanorine, or lecideine, or lirelliform. Examples, *Lecanora* (Plate II. 6, 11), *Pertusaria* (Plate II. 12), *Lecidea* (Plate II. 3, 5), *Graphis* (Plate I. 2), *Arthonia* (Plate I. 4).

Series 6. Pyrenodei.—Thallus peltate, or crustaceous, or beneath the bark, or wanting; apothecia angiocarpous, with an opening.

Series 7. Peridodei.—Thallus thin, often wanting; apothecia angiocarpous, without an opening.

FAMILY IV. Myrangiacei.—Thallus altogether cellular, without layers; fructification not discrete.

LICHFIELD, a city, municipal borough, and county of a city of England in the county of Stafford, 116 miles north-west from London, and 17 miles south-east from Stafford, by the North-western Railway. It is of great antiquity, the bishopric having been first established by Oswy, king of Northumberland, about 656, and a charter of incorporation granted by Richard II. in 1387. It stands in a fine valley, on a small affluent of the Trent. Many of the streets are narrow, but the houses in the principal of them are well built, and the whole city is paved and well supplied with water. The cathedral, an Early English building, was much injured by Cromwell's soldiers, but thoroughly repaired by James Wyatt, the architect, in 1788. It stands near a beautiful piece of water on the north side of the city, and consists of a nave, choir, transept, central tower with a spire, and two other spires at the west end. The total length is 410 feet; the length of the transept, 153 feet; and the height of the central spire, 280 feet. It contains many handsome monuments, including one to Dr. Johnson, who was born at Lichfield in 1709. In 1882 many parts of the building were restored and beautifully embellished. The bishop's palace is near the cathedral. The see comprises 536 benefices in the counties of Stafford, Derby, Salop, and Nottingham. The bishop's income is £4500, and that of the dean £3000 per annum. The former has the patronage of 116 livings. The cathedral library boasts of the Saxon Gospel of St. Chad and other literary rarities. The city contains a guildhall, market-house, grammar-school, where Ashmole, Addison, Johnson, Wollaston, and Garrick were educated (founded by Edward VI., and rebuilt in 1850), museum, and free library, five churches, and several places of worship for dissenters. The interior of the parish church of St. Mary was rebuilt in 1870 as a memorial of Bishop Lonsdale. There is a monument to Dr. Johnson in the market-place. There are some large breweries in Lichfield, and malting, flax-spinning, paper-making, and coach-building are also carried on. Near the town are some extensive market gardens. The municipal borough, divided into two wards, is governed by six aldermen (of whom one is mayor), and eighteen councillors. Lichfield was formerly a parliamentary borough, and re-

turned two members up to 1867 and one until 1885. The population in 1881 was 8360.

The name is said to be derived from *Licedfield*, the field of carcases, from the massacre of over 1000 Christians during the Diocletian persecution. The place of the slaughter is still called Christians' Field.

LICHTENBERG, a former German principality of 220 square miles, once called the lordship of Baumholder, and now included in the Prussian Rhein-Provinz. It was ceded in 1816 by Prussia to the Duke of Saxe-Coburg, who gave it the rank of a principality, and who held it till 1831, when it was again given up to Prussia for an equivalent of 80,000 dollars a year.

LICINIAN ROGATIONS. These laws, which together formed the famous Reform Bill of ancient Rome, were brought in before the Roman commons by Caius Licinius Calvus Stolo nine years in succession (some say eleven years), till they were passed all together in 367 B.C. They were the result of a combination of the poor farmers with the wealthy plebeian aristocracy. The latter aimed at the highest offices, till then limited to the patricians, the former at some alleviation of their many hardships. The Rogations were as follows:—(1) To admit plebeians to the consulship, one consul at least always to be a plebeian; (2) to admit them also to the great college of priests, particularly to those conserving oracles, and the Sibylline books, &c.; (3) to limit the burgesses to 500 jugera (say 300 acres) of national land in personal occupation, and to limit any one ownership of cattle to 100 oxen and 500 sheep as far as grazing on the common lands was concerned; (4) to compel landlords to employ free labour as well as slave labour; and (5) to reduce all exorbitant interests, and give fair terms for repayments of debts incurred during the hardships of the early times. The object was to seize a part of both civil and spiritual dignity for the plebeian aristocrats and for the poorer folk, to help the large class of debtors, and find employment for those out of work.

LICINIUS, the name of a distinguished plebeian gens or clan at Rome, whose most famous families were those of Crassus, Lucullus, and Murena.

The first Licinius to make a great mark in the history of Rome was Caius Licinius Calvus, surnamed Stolo, who as tribune successfully strove (376 to 367 B.C.) that the consulship should be thrown open to plebeians as well as patricians, and thus not only prevented a disastrous civil war, but laid the foundations for the greatness of the republic. Lucius Sextus was the first plebeian consul (B.C. 366); Licinius himself was consul B.C. 364 and 361. His great work was embodied in the LICINIAN ROGATIONS. He was himself found guilty of holding land in excess of his law and fined, in later life.

Another Licinius (C. Licinius Macer), impeached for extortion by Cicero (B.C. 66), committed suicide when he found the trial going against him. He had written a large part of the history of the city from the earliest times; unfortunately there is no trace of the work now left. The same remark applies to his son, whose oratory and poetry made a very great mark in his own age. Ovid, Catullus, &c., bear witness to his glory. See also CRASSUS, LUCULLUS.

LICINIUS was also the name of a Roman emperor who reigned 307–324 A.D. (Publius Flavius Valerius Licinianus Licinius), a Dacian peasant, who won the favour of the Emperor Galerius as a youth, rose to the highest rank, and obtained such renown that Maximian II. was glad to accept terms for a division of the empire on his accession in 311 A.D. He married Constantine the Great's only sister, and it came about, by the defeat of Maximian at Licinius' hands, that the brothers-in-law were the only two sovereigns left of the six by whom the empire had at first been ruled. War between these two raged from 315 to 323, when the great battles of Adrianople and

Chalkêdôn gave the sole sway to Constantine. Licinius was promised honourable captivity, but was executed on the first convenient pretext (A.D. 324).

LICTOR, a public officer who attended on the principal Roman magistrates. The kings, and afterwards the consuls, were attended by twelve lictors, the dictator by twenty-four, and the master of the horse by six. The duty of the lictor was to see that proper respect was paid to the magistrates, and to inflict punishment on those who were condemned. The lictors carried on their shoulders rods bound in the form of a bundle, with an axe in the middle.

LICUA'LA is a genus of PALMS, consisting of thirty species, natives of eastern tropical Asia, the Malay Archipelago, and North Australia. The young trunks of *Licuala acutifida* supply the walking-sticks known as "Penang lawyers." As a rule these palms do not grow more than 4 or 5 feet, though sometimes they are found as high as 20 feet. This genus belongs to the tribe Corypheæ. The species are all low shrubby palms, with terminal leaves; the flowers are hermaphrodite, the calyx and corolla are three-lobed, there are six stamens, a three-cornered ovary with the lobes slightly coherent, with a single filiform style.

LIEBIG, BARON VON, a celebrated chemist, was born at Darmstadt, the capital of the grand-duchy of Hesse-Darmstadt, on the 8th of May, 1803. After having completed his classical education at the gymnasium of his native city, he was in 1819 entered as a student at the University of Bonn, where he pursued his studies with great industry and success. From Bonn he was transferred to Erlangen, where he continued to follow up his chemical studies, and where he took the degree of doctor of medicine before he was of age. In 1822, or the following year, he was sent to Paris at the expense of the Grand-duke of Hesse, who allowed him a bourse or pension under the name of a travelling stipend; there he remained for about two years more, still prosecuting his chemical studies, and associating with the most distinguished of the chemists of that country, of whom the best known, perhaps, were MM. Gay-Lussac, Dumas, and Pelouze. In 1823 he communicated to the French Academy of Sciences a memoir on "Fulminic Acid and the Fulminates," which excited so much interest, not only in Paris but in other countries, that Humboldt invited the author to his house and introduced him to the circle of his scientific friends. Resolved to stand his friend in more important matters, that distinguished patron of science gave him such strong letters of recommendation to the authorities of the University of Giessen that, although he was only just twenty-one years of age, he was appointed professor-extraordinary of chemistry, a position which, some two years later, he exchanged for the higher and more permanent post of ordinary professor. He now, under the patronage of the government (for which, no doubt, he had in some measure to thank his kind and discriminating patron, Humboldt), commenced a model laboratory for teaching practical chemistry, which attracted students from every part of Europe, not to speak of other quarters of the globe.

Liebig published several works, the most popular, and that by which his name will be most widely remembered, being "Familiar Letters on Chemistry considered in its Relation to Industry, Agriculture, and Physiology." Many of his views have been combated from time to time; but speaking generally, his principles of agricultural chemistry have found very many and distinguished supporters. Liebig must also be honoured with the credit of having very extensively simplified the processes for organic analysis, and of having by their aid made numerous investigations which were formerly impracticable on account of the complexity of the methods then in use.

His scientific attainments and valuable researches were rewarded with honours of various kinds in almost every country where natural science is held in repute. He was

a frequent visitor to England, and his presence was always gladly hailed at our leading agricultural and scientific meetings. He died on 18th April, 1873.

LIECHTENSTEIN, an independent sovereign principality, now included in the Austrian Customs Union, and the smallest of the states which composed the old German Confederation, but now forming an integral part of the German Empire, is situated between the Rhine, Switzerland, and the Tyrol, on the northern slope of the Rhetian Alps, the summits of which rise to an elevation of 5610 feet. Its area is 68 square miles, or about one-third of the county of Rutland; its population is 9000, of the Roman Catholic religion. The country is very mountainous; but it produces corn, flax, wine, fruit, and timber sufficient for the consumption of the inhabitants, who have also a good breed of horned cattle. The capital, Vaduz or Liechtenstein, is a market-town on the right bank of the Rhine, with a population of 1700.

LIED and **LIED-FORM**. *Lied* is the German for "song," but its musical use is now extended. Mendelssohn used it as signifying a song-like movement, not for the voice but for the pianoforte, calling his fascinating series of such compositions *Lieder ohne Worte* (songs without words). Songs and song-like pieces are frequently composed of one musical idea (perhaps in two divisions, or contrasting portions) enunciated once only or several times by repetition, according to the demands of the stanzas of the poetry, or the imitation of this when words are absent. But a still more usual form for songs is that of the march or minuet; namely, a melody A (usually in two portions), and a contrasted melody B (also usually in two portions). A appears first, then B, then A to close. The type is that of the minuet (A) and trio (B). Some musical teachers have endeavoured therefore to group this along with the simpler song-form above described under the general term of Lied-form. It was once a very prevalent term in analytic programmes of concerts, &c., but fortunately has not taken firm root. Song-form for the first variety, and minuet-form for the second, would appear to be better designations.

LIED'ERKREIS, LIEDERSPIEL, musical terms. Sometimes without telling a story dramatically, as does the cantata, a musical work of several numbers indicates a situation, or, so to speak, sketches out a scene by detached lyrics; and this is the *Liederkreis* (circle of song). The most beautiful example is that by Beethoven, "To the distant loved-one," and the next finest is the famous "Miller-maiden" of Schubert. Schumann and Brahms have also adopted this charming but somewhat trying form of composition. The *Liederspiel* of Germany is not very different from the French *Vaudeville*, or the English ballad-opera—a play with songs interspersed here and there. It is a form not now used, but there are famous examples in it.

LIÈGE, a province of Belgium, is bounded N. by Limburg, E. by Prussia, S. by Luxembourg, and W. by Namur and South Brabant. Its area is 1120 square miles, and the population in 1883 was 683,769, most of whom are Walloons. The southern portion of the province is hilly and undulating. The Ardennes Mountains cover a great part of the south. The soil differs much in quality. On the west side of the Meuse, and on the east side towards Limburg, the plains, valleys, and low hills are fertile, well cultivated, and afford rich pasturage; on the east side of the Meuse, where it is joined by the Ourthe, especially towards Luxembourg, the ground is rocky and stony. In this part of the province there are extensive forests. The principal river is the Meuse, which comes from Namur, and forms at first the boundary between the two provinces. After receiving the Ourthe it flows between high, steep, and often perpendicular rocks to the city of Liège, where it becomes broader; below this it flows north by east into the province of Limburg. The climate is healthy. The

country produces hops, corn, and a little wine; the pastures maintain great numbers of horned cattle and sheep. The mineral wealth of the country is considerable; there are valuable mines of lead, zinc, and iron; but more important than all these together are the numerous coal mines of the province. Of the mineral waters those of Spa are the most celebrated. The manufactures, which are very important, consist of all kinds of steam machinery for railways and factories, mill-castings, fine woollens, merinoes, linen, cotton stuffs, cutlery, and surgical instruments, fire-arms, glass, hardware, &c. The province is crossed by the Liège-Namur Railway, and by the line from Ostend to Cologne.

LIÈGE (*Lüttich, Luik*), the capital of the above province, is situated in a valley at the junction of the Ourthe with the Meuse, and had a population of 129,206 in 1883. It is the seat of a bishop and of the supreme court of justice for Liège, Limburg, Namur, and Luxembourg. The Meuse, on entering the city, divides into several branches, which form islands, bordered by handsome quays and connected by eight bridges. Liège is divided into the old and the new town, and has besides ten suburbs. Most of the streets are very narrow and dark in consequence of the height of the houses, and not clean. There are, however, a few broad streets, some good squares, and promenades. The city was formerly fortified, but at present it is defended only by a citadel, erected on St. Walburge's Mount on the north side of the town, and by a great outwork on the west side. The most remarkable buildings are—the cathedral, founded in 968 and renewed in 1280, and constituted the cathedral in 1802, in place of the old cathedral of St. Lambert, founded in 712, and wrecked by the revolutionists in 1794; the palace of justice, formerly the palace of the episcopal prince; the theatre; the church of St. Jacques; and the university, which was founded in 1817. There are a gymnasium, several banks, and numerous learned and charitable institutions. Among the latter are schools for the blind and for deaf mutes. The extensive coal mines near the town, which employ upwards of 10,000 miners; its numerous iron works, royal cannon foundry, and establishments for the manufacture of firearms, hardware, broadcloth, glass, paper, watches, jewelry, and leather; its engine-factories, zinc-rolling mills, and naileries; its linen and cotton factories, steel-works, breweries, distilleries, and sugar refineries; together with a flourishing commerce in colonial produce and manufactured goods—render it one of the most important towns in Belgium, and one of the most industrial in Europe. It supplies firearms to nearly all the governments in the world. It has a chamber of commerce and manufactures, cabinets of chemistry and natural history, a botanic garden, and a school of mines. The principal manufactory for steam engines and machinery is that of the busy village of Sorling, 2 miles south-west of the town, which was founded by and is still carried on in the name of Messrs. Cockerill, natives of England. In the seventh century a village named Legia occupied a part of the site of the present city. In 712 Liège was erected into a bishopric. In the tenth century its bishops were raised to the rank of independent sovereign princes. In the succeeding ages continual wars and disturbances prevailed between the burghers, who were ardently attached to popular institutions, and the prince-bishops. It was taken on the 30th of October, 1468, by Charles the Bold, duke of Burgundy, and barbarously delivered up to military execution. It was the capital of the French department of Ourthe from 1793 to 1814. In 1792 it was besieged and taken by the Duke of Marlborough.

The Pont des Arches, which is the chief communication between the two quarters on either side of the river, has taken the place of an older bridge, which was the scene of many memorable events. Bishop Maximilian, elector of

Cologne and duke of Bavaria, caused a strongly fortified tower, named La Dardanelle, to be erected on it in 1685, to prevent communication between the two quarters of the city during civic revolts. At that period the bridge was the great rallying-point of the seditious citizens, who were harangued here by their demagogues. On 27th July, 1794, it was the scene of a fierce and bloody struggle between the Austrians and the French, in which the former were compelled to retreat to the shelter of the batteries of the Chartreuse. In 1468, when Charles the Bold of Burgundy was invoked by the bishop to suppress an insurrection of his turbulent subjects, the barbarous conquerors wreaked their vengeance on many of the wives and daughters of the unfortunate citizens by placing them in boats and sinking them in the river at this spot.

LIEG-NITZ, one of the three governments into which SILESIA is divided, comprises the most north-westerly part of that province, and that part of Upper Lausitz which now belongs to Prussia.

LIEGNITZ, the capital of the above government, stands at the junction of the Schwartzwasser and the Katzbach, 180 miles by railway south-east from Berlin, and had 37,157 inhabitants in 1882. The inner and older part of the town is surrounded with a moat and rampart of earth, which is laid out in gardens and planted with trees; it is entered by four gates. The Church of St. John, the Ritter Academie, the Fursten Cappelle (the burial-place of the princes of the line of Piast), and the hospitals of Stanislaus and St. Nicholas are the principal objects of interest. There are also an ancient council-house, an academy, an orphan asylum, and a workhouse. The manufactures are cotton and woollen stuffs, silk, linen, leather, and tobacco; and its vicinity is famous for horticulture. Formerly it was fortified; and here, on the 16th August, 1760, the Prussians, under Frederick the Great, totally defeated the Austrians.

LIEN (from the French *lien*, a tie or band). The following definition is perhaps as correct as any that has proceeded from the judges:—"A lien is a right in one man to retain that which is in his possession belonging to another till certain demands of the person in possession are satisfied" (Grose, J., in "Hammond v. Barclay," 2 East, 227). The definition therefore includes possession (in some sense) by the party claiming the lien; and an unsatisfied demand by him against the owner of the property.

It has been said that "liens only exist in three ways: either by express contract, by usage of trade, or where there is some legal relation" (Bayley, J., 1 Ba. and Ald., 582).

When lien arises by express contract, it is simply mortgage, pawn, or pledge, which are then the more appropriate terms; or it is an agreement (such as may exist in the case of principal and factor) that goods intrusted by one person to another for the purpose of sale, or for some other purpose than pledge, may be retained by the party intrusted with them as a security for any debt or balance due to him from the other; or it is an agreement that he may retain the proceeds of things intrusted to him to sell, for the same purpose.

Where two parties have so dealt with one another that one has claimed and the other has allowed the right of lien in respect of any of their mutual dealings, lien may exist in all cases of like dealings between them, if there be no verbal or written agreement to the contrary. The acts of the parties are here the evidence of the contract.

The "lien by usage," and that "where there is some legal relation between the parties," belong to one class, and are not distinguishable. They are both included under liens which arise from implied contract. The "usage of trade" is merely evidence from which contract is to be implied; parties who mutually act in conformity

to a custom have in effect, though not in form, made a contract. The term "legal relation" is only another mode of expressing the mutual rights and duties of the same parties, who by their acts have brought themselves within the limits of a custom, and so given evidence of an intention to make a contract. Thus an innkeeper has a lien upon the horse of his guest which he stables and feeds.

Lien, unless there be an express contract, or a custom to the contrary, must from its nature be *particular*; that is, must have reference to a particular transaction and to a particular thing. When it is *general*, that is, where the right to retain a particular thing is not limited to a particular transaction, but exists with respect to other transactions also, there must be express contract, or the dealings of the parties must be such as to create that implied contract which arises from acts done in conformity to well-known usage.

Lien may be lost by voluntarily parting with the thing, by express agreement, or by agreement to be implied from acts. In general, when a person has a lien for a debt, he waives it by taking security for the debt.

In equity the vendor of an estate, though he has executed a conveyance and parted with the possession without being paid, still has his estate as a security for such part of the purchase-money as is unpaid. This security is generally, though not with strict propriety, called the vendor's lien. The ground of this so-called lien lies in the nature of the contract: one party contracts to give land for money, and the other contracts to give money for land; and both parties must perform their engagement.

The practical questions which arise under the general doctrine of lien are numerous, and sometimes not easy of solution; many of them are of the greatest importance to the mercantile community.

LIERNE, in architecture, a rib intermediate between the main ribs of a Gothic vault, and distinguishable therefore as not rising from the impost. The beautiful groining of the finer Gothic roofs depends upon the lierne ribs for the completion of its star-like forms.

LIEUTENANT, any officer who discharges the duties of a superior in his name and during his absence, and who acts immediately in subordination to him when he is present. Thus, in military affairs, the lieutenant-general and the lieutenant-colonel respectively superintend the economy and the movements of the army and the battalion under those who hold the chief command. For many years past, however, the lieutenant-colonel has been the officer actually in command of a regiment, the colonelcy having gradually become a sinecure appointment except in the artillery and engineers. The lieutenant of a company is also immediately subordinate to the captain, in whose absence he has the same powers. In the British service the lieutenants of the three regiments of Foot Guards have the rank of captain; in the Royal Regiment of Artillery, the Royal Corps of Engineers, and the Marines there are no ensigns; the subaltern officers were formerly distinguished as first and second lieutenants. Since the abolition of the office of ensign in the infantry and cornet in the cavalry the lowest grade of commissioned officer in the British army is styled a sub-lieutenant. The pay of a lieutenant in the army varies from 10*s.* 4*d.* a day in the Life Guards to 6*s.* 6*d.* in the line.

A lieutenant in the royal navy takes rank as a captain in the army, and the number appointed to ships of war varies with their rate. Their full pay, when in command of a sea-going ship, is 14*s.* 9*d.* a day, when without command 11*s.* 6*d.*, and that of a sub-lieutenant 5*s.*

LIEVRITE is the name applied to a silicate of iron and lime that occurs chiefly in the island of Elba, but which is also found sparingly in some other localities. It has received this name after its discoverer, the mineralogist Le Lièvre, but is also sometimes called Ivaite or Yenite.

LIFE. Organic matter, in which alone the phenomena of life are cognizable to our senses, is distinguished from common or inorganic matter by several peculiarities of composition and structure. Twenty elementary substances occur frequently in organic matter, viz. oxygen, hydrogen, nitrogen, carbon, phosphorus, sulphur, iodine, bromine, chlorine, fluorine, potassium, sodium, calcium, magnesium, silicon, aluminium, iron, manganese, copper, and lead; and many others occur less frequently. Of these the first four, on account of their universal presence in organic matter, have been called organic elements. They are found united in a complex compound called protein, never yet obtained except as a product of a living organism. Protein, largely mixed with water, is the chief constituent of that primary life-substance *protoplasm*. And although the elementary substances of which organic matter is composed are the same as those of inorganic matter, their mode of combination is also peculiar. In minerals the elements are generally united in pairs, or according to a binary mode of combination; but in organic matter three at least, and usually four elementary principles are combined in each simplest substance or proximate principle. In organic compounds, again, the elements are not generally united in any simple ratio one to another, as in inorganic bodies, as 1 atom of one to 1, 2, or 3 of another, but several (as 10 or 12 of one) are united with several of each of the others to form one compound atom. In respect of structure, it is observed that all organic bodies, plants as well as animals, have a more or less rounded and cylindrical, branched or membered form, bounded by curved lines, and by convex or concave surfaces very distinct from the crystalline (the only regular) form of inorganic matter.

All the parts of an organic body are, both in their origin and in their continuance, more or less dependent upon one another. In their original formation, the production of one part induced that of another; and, when formed, the action of one influences the actions of all.

The maintenance of the living being, during a certain length of time, by the mutual changes which take place between it and the external world, is the most general phenomenon observed in organic bodies during life. It is a compound process, consisting (1) of the reception of materials from the external world as nutriment, which is taken up by absorption and carried on by a peculiar motion in vessels, or through the interstices of the tissues; (2) attraction of aeriform substances from without, and separation of other aeriform substances from within, constituting respiration; (3) conversion of the absorbed nutriment and aeriform substances into the peculiar fluids of the body, or assimilation; (4) the motion of these fluids through the body by circulation or other means; (5) conversion of the fluids into a solid form, or the combination of them with the solids, so as to maintain the peculiar properties of the latter, constituting nutrition properly so called; (6) the preparation and separation of fluids of peculiar kinds from the assimilated fluids, or the formation of secretions. These processes, which are called the nutritive functions, occur in a more or less distinct manner in all living bodies, plants as well as animals, and are essentially characteristic of life, since nothing analogous to them is ever observed in inorganic bodies. In these processes two distinctive features appear:—(1) The phenomena of *disintegration and waste* continually going on from the commencement to the conclusion of the life of a living organism, and the corresponding phenomena of the *taking-up of new matter* to repair that waste; and (2) the *cyclic nature of the life-changes* of each species of organic life. The first of these distinctions is sufficiently obvious as occurring to life alone; the second needs a few remarks. All living matter proceeds from other living matter; we know of no independent origin of living things. Spontaneous generation has as yet never been proved, as it is purposed pre-

sently to show. But an organism which thus parts with a portion of itself as seed is repeated by that seed in its development; and if the repetition is not at first exact, as when a tadpole comes from a frog's egg or a caterpillar from a butterfly's, yet eventually the cycle is made up, and from the tadpole we arrive again at the frog, from the caterpillar we reach the butterfly. The new form also propagates itself in like manner. Each individual, when it has fully developed, dies, and its elements resolve themselves by oxidation; the species being, by reproduction, everlasting, the individuals temporary.

Finally, all life is dependent on moisture and warmth, elements not necessary in the existence of minerals; and even when, as in the case of rotifers and other minute organisms, we find living things which may be desiccated and blown about as dust, the vital properties are perfectly in abeyance until warmth and moisture are supplied. No good explanation of the intermediate state, and how it differs from death, has yet been given, and the phenomenon only occurs in the most rudimentary forms of life. A kindred instance may be given in seeds, which retain their potential life for long periods. Fine crops of wheat have been raised from grain buried with Egyptian mummies of the time of Moses; but here, unlike the rotifers, the wheat grains never were alive in the true sense, they only possessed the potentiality of life. The limits of temperature between which life can exist are comparatively narrow. Heat sufficient to decompose protein is, of course, fatal to life. The greatest heat and cold bearable without destruction by any kind of life is borne by the simplest forms, as might be imagined. For heat Pasteur has exceeded 250° Fahr. with the dry spores of fungi; but death came with a less heat (about 212° Fahr.) when the spores were moist. For cold, Cagniard de la Tour has revived yeast after exposing it in the dry state to -76° Fahr., which is 108 degrees below freezing; but in the moist state it died at 23° Fahr., or 9 degrees below freezing. Higher organisms have narrower and narrower limits, roughly according to their rank in the great army of life, until we arrive at such complex organisms as that of man, when comparatively few degrees of temperature more or less are fatal to existence.

But what life is we know no more than we know what light is, what heat and electricity are; and it seems highly probable that we never shall know. It is sufficient for us to be able to explain the different manner in which living things and non-living things exist, to study the laws of life, and to admire its wondrous development, to rejoice with its birth and progress, and to feel sadness at its decay.

"Brains are vainly taxed with guessing
Way the world its form assumed;
Few have ventured on confessing
Light on *why* has never loomed
Since primal darkness gloomed.

How the world is forward going,
Bit by bit has man explored,
How, not *why*, is worth our knowing,
Telling of a single cord
Binding all to one great Lord."—A. J. Ellis.

It has been said that life only comes from life; and yet infusions of hay, &c., which, after long boiling, are perfectly dead, soon contain thickly congregated organisms when exposed to the air. But this is because the air supplies to the infusion seeds or desiccated creatures, which then grow and flourish in a congenial medium. If the flasks are stopped with cotton wool, or are hermetically sealed, no life comes. Or they may be opened, as in Tyndall's long-continued series of experiments, in places where the air is purified, such as in the ice-cold regions of the higher glaciers of the Alps; and here also no life is generated from such killed infusions. Among all the numberless experiments yearly performed in the never-ceasing struggle with this great problem, not one has given fair grounds

for believing that life has arisen either in inorganic matter, or in dead organic matter. See GENERATION, SPONTANEOUS.

LIFE, DURATION OF. See MORTALITY, LAW OF. **LIFE-BOAT.** See BOAT.

LIFERENT, in Scotch law, is the right to use and enjoy a subject during life without wasting its substance (Ersk., "Inst." II., 9, 39). Its origin is attributable to the servitude of *usus fructus* in Roman law, from which it differs rather in the nature of the subjects of which it may consist than of the use permitted of them. In Scotch law the subject of liferent may be either heritable subjects or money. The proprietor of the subject is named the fiar, and the person enjoying the use of it the liferenter. There are two liferents established by the mere disposition of the law, of which the one, called *terce*, consists in the right of a widow who has produced a living child to the liferent of one-third of the heritable estate of which her husband died fiar; and the other, called *courtesy*, is the right of the surviving husband of an heiress, when the marriage has produced an heir to the estate, to a liferent of the whole heritable estate of his wife to which she may have succeeded by inheritance. Besides these, liferents may also be constituted by agreement, and such are termed conventional liferents. In these the respective rights of the liferenter and the fiar are, generally speaking, regulated by the deed of constitution. Liferenters are not entitled, in the absence of express stipulation, to grant feus or leases to be effectual beyond the liferent.

LIFE-SAVING APPARATUS. Among the immense number of shipwrecks which occur annually upon the coasts of Great Britain, it has been found by experience that a certain proportion always occur close to the shore, and considerable ingenuity has been displayed in devising means of communication with the stranded vessels. Where the distance is not greater than 50 yards, a stout stick loaded with lead has been used to convey a thin cord, by means of which a small rope, and afterwards a hawser, could be drawn, and at the close of the last century Sergeant Bell (afterwards lieutenant) of the Royal Artillery showed how a cord might be attached to a shot and the latter fired from a gun for a much greater distance. In 1801 a *life mortar* was designed by Captain Manby, by means of which the position of a ship in distress could be rendered visible by illuminating shells, and a hooked shot attached by strips of raw hide to a cord thrown out for a considerable distance to sea. The apparatus was simplified by Colonel Boxer, whose *life bolt*, fitted with fuses, served not only to carry the cord, but also to shed a bright light as it passed through the air. At a later period rockets were tried as means for conveying a cord, and after many experiments, the double rocket designed by Colonel Boxer was found to be the most effective. In this, two rockets are combined in one metal cylinder, and the whole is secured to a stick, to which the cord is attached. The rockets are placed one before the other, and when the ignition of the foremost has carried the cord to the highest point of the trajectory, the second is calculated to explode and give an additional impetus. In the English system the rockets have taken the place of the mortars previously used, but the latter are still employed in France. After communication has been made with a shipwrecked crew, and a hawser drawn on board, the sling life-buoy, sometimes known under the odd name of the *petticoat breeches*, is generally used to bring the crew ashore. This consists of a life-buoy of the ordinary pattern, to which is attached a stout canvas bag through the bottom of which holes are made, so that a man can rest his arms on the top of the buoy and pass his legs through the canvas at the lower part of the bag. By means of tackle this sling buoy can be drawn backwards and forwards between the ship and the shore, and thus the shipwrecked crew may be brought

off one by one until all are rescued. Even then the apparatus need not be lost, for a hawser cutter has been designed which may be worked from the shore, and which serves to detach the hawser from the mast of the wreck, and enables it to be drawn back to land. The number of lives saved by the use of this apparatus varies considerably, but taking an average of several years, it may be said that over 300 persons are yearly saved from drowning by its means. The rockets are placed under the care of the Coastguard, and the men are all instructed in their use. See also **BOAT**; **BUOY**; **LIFE**; and for the apparatus designed to save life endangered by fire, see **FIRE ESCAPE**.

LIFFEY, a river of Ireland, rises in the Wicklow Mountains, 1256 feet above the sea-level, at the head of the valley between Kippure and Donce, $7\frac{1}{2}$ miles south-west of Bray, and close to the source of the Dodder, with a tortuous course of 50 miles to Dublin Bay. The chief tributaries are the King's River, Rye, Poddle, Bradogue, and Comoe; the Dodder and Tolka join the head of its estuary. The area of its basin is 568 square miles.

LIFTING or **HEAVING** was a very ancient Easter custom with our ancestors. It is said still to survive in remote parts. An account of a lifting of Edward I. in his bed by seven of the queen's ladies is still extant. The object was no doubt a rude representation of the resurrection. At Warrington and Bolton up till quite recently the women would go in parties of six or eight, and taking hold of male friends whom they met, would lift them thrice as high as they could, with many shouts. This was on Easter Monday. The men retorted in kind on Easter Tuesday. The custom degenerated into an excuse for extorting small sums of money from the persons lifted. A careful account of the custom as practised at Manchester is given in the *Gentleman's Magazine* for 1784, and it was then so common that it led to disorders and was being yearly prohibited by the town-crier.

LIG'AMENT is the name given to those bands of white fibrous tissue which play so important a part in tying together the bones of the skeleton. In the cases of joints, as the capsular ligament of the knee [see **KNEE**], they hold the joint together; in the cases of groups of bones, as the ligaments of the foot [see **FOOT**], they bind them together, not so tightly as to impede their due motion, but so as to maintain the proper shape of the group. They sometimes are mere round cords, and are then styled *funicular*; the flat bands, the usual shape of ligaments, are called *fascicular*, and the ligaments surrounding joints are called *capsular*.

LIGAMENTUM NU'CHÆ is that great ligament which sustains the weight of the head in quadrupeds, so that they graze, constantly keeping the head stooping downwards, without any effort. The usual white fibrous tissue is largely intermixed with yellow elastic tissue in this important ligament.

LIG'ATURE, in music, as now used, signifies a *tie* or *bind*, a curve connecting two notes, and having the effect of absorbing the second into the first, which accordingly sounds as long as the combined value of the two tied notes. But the ancient meaning of the term was far other. It simply meant a passage sung to one syllable, and was indicated in the old square-note notation (or Gregorian notation) by the notes being written either actually touching each other or very close to each other. Sometimes a continuous stroke was drawn across the positions of the notes of a small scale passage; sometimes notes at an interval of a Third or Fourth were placed one over the other, in the same vertical line, but the lower one was always to be sung first. The interpretation of ligatures is one of the most difficult questions in musical antiquarianism, as it is encumbered with a cloud of rules, permitting alterations of the values of notes according to their position in the ligature, &c.

LIGHT. In considering so wonderful a sensation as that of sight, philosophers very early struck out theories of the manner in which it might be physically caused. A favourite hypothesis among the ancients was that all bodies were perpetually throwing off impalpable images of themselves, and that one of these striking upon the eye permitted the body whence it emanated to be seen. But although the difficulty of a large house sending its image complete in every outer part into so small a space as the human eye was met more or less successfully, this theory fell at one blow before the remark that such images or emanations, if they existed, would enable us to see equally well in the dark. It was evident, therefore, that the sense of sight depended entirely upon light.

But the problem was not solved by its new statement. It was apparent that we saw by light; the question remained, How is it that light causes us to see objects? The older philosophy was resuscitated in a new form. It was long maintained, even by so great a man as Sir Isaac Newton, that light was a substance, and that we saw by the light corpuscles actually entering the eye and striking with a faint impact upon the retina. All luminous bodies were held to send out streams of these corpuscles. Yet the most delicate balance fails to show any increase of weight in a scale exposed for many hours to the fiercest light while its fellow scale is in shadow. It was therefore practically impossible to defend such a hypothesis as soon as another was found which would explain all the facts of light as well as the corpuscular or emission theory, and would not require to postulate substances the gathering of which made the receiver no heavier, and the loss of which made the light-source no lighter.

This hypothesis, which is now universally admitted, was invented by Huyghens and improved by Euler, and was at length developed by Thomas Young, professor of natural philosophy at the Royal Institution of London, thoroughly worked out, and published by him in 1807. So carefully did he elaborate his theory, that it has scarcely been added to by subsequent observers. Huyghens invented the theory that light was a wave-motion; but as he could not have wave-motion without a medium, and as air, which serves for sound waves, was for many reasons inadmissible as the medium for light waves, he invented a new substance, pervading all space even beyond the bounds of the earth and its atmosphere, but of the entire so in system. This he called the *luminiferous ether*, and figured it as filling the vast universe, stretching between the furthest stars, and yet so light as to be without gravity, and so thin as not to impede the motions of the planets, while it is so subtle that it penetrates the densest bodies. Such a conception cannot but be revolting to our reason, while we are compelled to admire its boldness. It rests as a mere hypothesis, serving us well until we know something better. We may put it this way: if there were such a substance as this ether filling all space, then light waves would behave as they do. So long as this hypothetical existence, and no other, is claimed for the ether, its invention can do no harm. Formerly there were crowds of ethers—ethers for the planets to swim in, electric ethers, magnetic ethers, vital ethers for nerve-force, and so on. The luminiferous ether is the only one to survive.

But sceptical as one may be about the existence of a weightless and quite intangible substance which is here claimed to exist as the medium of light, no such scepticism is longer admissible as to the nature of light itself. The luminosity of a body is due to intensely rapid molecular vibration, which vibration is propagated in a medium, the ether, or some other, and so travelling forward as ripples travel on the surface of a lake in ever widening circles, reaches our eye even from the furthest stars. Like the ripples of the water, so the light waves are due, not to forward motion of the medium in which they travel, but

to the transverse vibration of each molecule. Drops of water do not move to and fro; they move up and down, each drop in its turn forming the crest of the wave as it passes by, and then sinking through the whole figure of the wave to form the trough at last. The drops of water in fact vibrate across the path of the wave, exactly as a long rope vibrates when shaken at one end. There is a difference, however, as regards the light waves, for they move in all directions from the light-source, not as do the water waves or the rope waves, in one plane only; and the vibrations are not only vertical in a plane transverse to the path of the waves, as is the case with water waves, but cross the path of the wave in all directions in that plane. To use a very rough image, the light waves radiate on all sides.

Like all great discoveries this *undulatory theory* of light is continually productive of further discoveries by virtue of its own truth; the kinship of light, of chemical action, of heat, of magnetism, electricity, &c., are derived from it, sound is found to be analogous in every point, and the phenomena of polarization and all the triumphs of spectroscopy, or the science of the spectrum, find a full explanation.

Bodies are divided, from an optical point of view, into luminous and non-luminous; and the latter again into transparent (not hindering sight), translucent (hindering sight), and opaque. But every body if sufficiently thick is opaque, and if sufficiently thin is transparent. Thus it is a device of astronomers to deposit a thin layer of silver on a telescope glass when they are observing the sun, for thus the heat and much of the light are reflected, and the transparency is yet sufficient. On the other hand, it is believed that the great depths of the ocean are in perpetual darkness, since the light waves are absorbed by the vast thickness of the water they in vain try to penetrate.

Light is evolved from a luminous body in all directions; it is manifest then that from each luminous point extends a cone of rays. This cone is called a pencil, and is said to be convergent or divergent according to which direction of it is under consideration. A single ray is sometimes considered, and it is also assumed that rays may be parallel, either absolutely or practically, as when they form part of a cone of very small angular divergence. Light always travels in straight lines, like every other form of motion; and if it deviates from this the deviation is due to the controlling action of the substance through which it is passing. If it meet an opaque body it is thrown back or reflected; the rays passing each side of the body continue their course, but they leave a lightless space behind the body: this is a *shadow*. Lunar eclipses are caused by the earth's shadow in space; if the path of the moon take her through the earth's shadow, her light is blotted out by the interposed mass of the earth. Shadows might be expected to be rigidly defined if luminous bodies were exceedingly small, but as such bodies have a certain magnitude it is clear that the shadow cast by the interception of rays from the top edge, for instance, would be partly illuminated by the rays from the lower edge, which strike the opaque body at a less angle. There is therefore always a *penumbra* or half-shadow surrounding the *umbra* or deep shadow. Further, the shadow is always partly illuminated by neighbouring light waves, just as in a torrent the water curls round a rock which obstructs its direct course.

The *velocity of light* is enormous. It was long held to be instantaneous; but in 1675 a Danish astronomer, named Rømer, observing Jupiter's satellites, found that there was a difference of $16\frac{1}{2}$ minutes in their entrance into the shadow of the planet, according as this was observed from the nearest part of the earth's orbit, or the furthest. It was evident, so soon as this fact was accurately substantiated, that light took $16\frac{1}{2}$ minutes to cross the earth's orbit; that is to say, it would take about $8\frac{1}{2}$ minutes to come from the sun, giving a velocity of 190,000

miles per second. The light from the nearest stars takes therefore three years to reach us. As to the furthest stars, we may be said to be even uncertain of their existence, for though they might have been destroyed long since, the light which had started before their annihilation would still reach us in a stream for many thousands of years. This old observation of the velocity of light has been checked in our own day by Foucault, who got a value of 185,187 miles a second with an ingenious mirror-apparatus; and by Cornu, who investigated the velocity on a basis of 12 miles, sending a ray to a station 6 miles off, and receiving it as it was reflected back from a mirror upon a rapidly rotating toothed wheel, which showed the time it had taken to perform the double journey. Cornu's result, perhaps the best yet obtained, gives 185,420, and tallies closely with deductions from observations on the transit of Venus in 1874. The latest important result is due to Michelson, working with an improvement of Foucault's apparatus; he gets 186,830 miles per second as the velocity of light. The phenomenon of *aberration* results from light having a sensible velocity. Let a ray of light from a star (fig. 1 in the Plates illustrating this article) be received on a small screen, A, having an extremely minute opening, A, in its centre; and let that ray which passes through the opening be received at any distance, A B, on a screen, B, perpendicular to its direction; and let B be the point on which it falls. If, then, we join the points A B by an imaginary line, that line will be the direction in which the ray has really travelled, and will indicate to us the direction of the star. But let us suppose the apparatus meanwhile carried along in the direction A C, B D, the ray passing through the aperture at A will still strike the lower disc at B, but the aperture A having moved to the point a during the time the light has travelled between A and B, the ray will now have the appearance of having fallen from a, in the direction a B.

When a given object is enlightened by a luminous surface of small but sensible size, the degree of its illumination is proportional to the area of the luminous surface multiplied by the intensity of its illuminating power, and divided by the square of the distance of the surface illuminated.

Intensity of Light (Photometers).—The rays being supposed to diverge in every direction from a luminous object, it follows that, if a small cone of rays were intercepted by any plane surface, which may be considered as part of the concave surface of a sphere having the radiant point for its centre, the intensity of the light on the surface will be inversely proportional to the square of its distance from that point. It is also evident that two luminaries are equal in absolute light when, being placed at equal distances from, and in similar situations with respect to, a given smooth white surface, or two equal and precisely similar white surfaces, they illumine it or them equally. This appears from figs. 2 and 3 in Plate I. A B C D is a section of a small rectangular box open at both ends, and blackened within. On the inside, inclined at angles of 45° to its axis, are placed two rectangular plane mirrors, E C, F D, exactly alike, and fastened so as to meet at F, in a narrow slit, E F G, covered with a slip of fine tissue paper. To compare the powers of the lights E C, F D, place them at such distances from each other and from the instrument between them, that the light from every part of each shall fall on the reflector next it, and be reflected to the corresponding part of the paper, E F or F G. The instrument is then to be moved nearer to the one or the other till the paper on either side of the division F appears equally illuminated. Such instruments for comparing the intensity of light are called photometers.

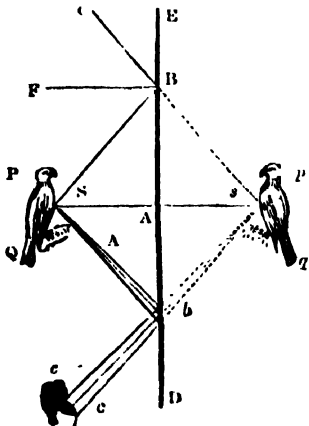
A convenient method of comparing the intensity of the light from two luminaries is illustrated by fig. 4. Before a screen, C D, of white paper in a darkened room place

a blackened cylindrical stick, s , and let the flames L & I be so placed as to throw the shadows, AN , of the stick on the screen. Then move the lights till the two shadows appear of equal intensity. Their total illuminating powers will be in the direct ratio of the squares of their distances from the screen.

Again, if light from any luminous object pass through a small aperture and fall upon a screen in a darkened room, there will be formed an inverted image of the object (fig. 5), its magnitude being inversely proportional to the square of the distance of the object; now the intensity of light on the image, which is inversely proportional to the square of that distance, is also inversely proportional to the magnitude of the image; and it follows that the brightness of the image is constant, whatever be the distance of the luminous object. The eye is such a darkened room, and therefore a luminous object should appear of equal brightness at all distances; but the absorption of light in the atmosphere causes the greater dimness of distant objects. Again, in fig. 6, let A be a small aperture through which light falls from the sun, s , on the screen, B , in which there is also an aperture through which the light passes to another screen, C ; it is evident that it then will not dilate itself as at B , and form an image of the whole sun, but only an image of that very minute portion of it which corresponds to the space occupied in its images on the first screen by the hole made there.

Reflection of Light.—If a body on which light falls be unpolished and opaque, a portion of the light enters into it for a small depth, and is there partially absorbed; the complementary portion is scattered in all directions; the surface therefore becomes itself, to that extent, a source of light, but the composition of the differently coloured rays may be widely different from that of the incident light. When the body on which parallel rays of light fall is polished, the rays which do not enter the body are reflected from it principally in one direction; this, for a single ray, is in a plane passing through the ray perpendicularly to the reflecting surface (this is called the plane of reflection). By experiments made for the purpose, it has been found that the angle which the reflected ray makes with a line perpendicular to the surface is equal to that which the incident ray makes with the same line; or, as we say, "the angle of incidence is equal to the angle of reflection."

When light diverging from any luminous point falls on a plane reflecting surface (as for example an ordinary mirror), it will, after reflection, diverge accurately from a point similarly situated at the opposite side of the mirror.



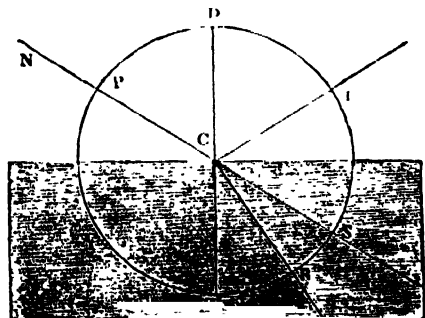
Let s be the luminous point, BD the mirror; draw SA perpendicular to the mirror, and produce it until $AS' = AS$;

let sn be an incident ray, join SB , and produce it to C ; then it is evident that $\angle SHA = \angle SBA = \angle CHE$. Now BC , being in the normal plane, SA , and making, with the normal BF , an angle, CBF , equal to the angle, SBF , of incidence, must therefore be the reflected ray. The position of s being independent of that of B , the point of incidence, it follows that every other reflected ray, bc , will diverge from the same point. Thus the reflected light will appear to an eye, e , as if proceeding from a point, s , behind the mirror similarly situated with s .

Hence, if any body, r , q , be placed before a mirror, DE , the light which emanates from r will appear after reflection to proceed from the similarly situated point, p , behind the mirror, and thus an image, p , q , exactly similar to the body, r , q , will be seen by looking at the mirror; the common looking-glass is a familiar example.

Catacaustics.—When light diverging from a point falls on a surface of any other outline than that of a conic section having the radiant point in the focus, it generally does not again converge to one point, or diverge from one after reflection, but each infinitesimal pencil will be dispersed according to a law depending upon the nature of the reflecting curve, the angle of reflection varying for each consecutive ray. The rays intersect one another in their reflected paths, and the locus of all such points of intersection forms an illuminated surface called a caustic by reflection, or catacaustic. This may be well illustrated by the following simple experiment by Sir David Brewster, shown in fig. 7 in Plate:—Bend into a concave form a narrow strip of polished steel, and place it upright on a sheet of white paper. If this be held so that the plane of the paper passes nearly through the sun, the caustic will be seen brightly traced on the paper. If the form of the spring be varied, all the varieties of the catacaustics, with their singular points, cusps, contrary flexures, &c., may be beautifully developed. The bright lines seen on the surface of a drinking glass full of milk standing in sunshine (clearer still on one full of ink) is a familiar instance of the caustic of a circle.

Refraction.—When light passes from one transparent substance to another, as from air to water, for instance, its path is not altered if it is perpendicular to the joint surface of the two media; but if the path of the light be oblique, then it no longer continues that path after entering the new medium. It is turned aside from it to a greater or less degree, differing for every different substance, but remaining the same at all times for the same substance. This alteration of the path of light passing from one medium to another, which is familiarly observed in the apparently bent form of a straight stick partially immersed in water in an oblique direction, is called refraction, as in fig. 8, where ACB is the refracting surface, rcp the perpendicular to it at the point of incidence c , sc the incident, and cs the refracting ray. Or let sn p , c ,



in the above illustration, represent a solar beam in vacuo, and incident at c on a transparent medium (as water), to

the surface of which DCB is normal. When the medium is fluid, place a graduated circle, DSE , in the plane of incidence, with its centre at C ; a portion of the light will be reflected in the direction CL , and another entering the medium will be refracted in the direction CR . If uninfluenced by the medium, its direction would have been CS . The angle RCB is the angle of refraction, DCN or ECS of incidence, and SCR of deviation. The arcs DR , DL , are equal by the law of reflection, and if we compare the arcs DP , ER , their sines will be found in a constant ratio, depending on the nature of the medium, but independent of the angle of incidence. Thus, if i be the angle of incidence, and r that of refraction, the two are connected by the simple relation $\sin. i = \mu \sin. r$. The constant μ peculiar to the medium is called its *index of refraction*.

Returning to fig. 8 in Plate, we see that while there is no limit to the angle of incidence which will yield refraction when a ray passes from a vacuum into a medium, there is a very definite limit for rays passing from a medium into a vacuum, and hence for those passing from one medium to another less dense medium. For as the ray, sC , is more and more inclined, as at $s'C$, $s''C$, &c., so also is the refracted ray more inclined, as at $s'c$, $s''c$, &c. The limit is clearly rcs''

where $\sin. rcs'' = \frac{\sin. 90^\circ}{\mu} = \frac{1}{\mu}$ (μ being the refractive

index). This limit (or *critical angle*) for water to air is $48^\circ 35'$, for glass to air $41^\circ 48'$, &c. Beyond the critical angle a ray entering the denser medium is totally reflected within the medium. For since the ray $s'C$ would be refracted to s'' , so, reversing the process, would the ray $s''c$ be refracted to s' ; what then is to become of a ray $s''c$? It never emerges, and is totally reflected to s''' . This reflection, being total, is more brilliant even than the reflection from quicksilver.

A painful illustration of this law occurs in the torturing mirage, which deludes the traveller in the desert into the belief that the palms he sees before him are mirrored in a cool lake. The rays from any elevated object pass to the observer through increasingly hot layers of air, the air next the burning sand being the hottest. But hot air is lighter, rarer, less dense than cool air; now as the angle of incidence is increased for less dense media, it grows greater and greater therefore, and at last reaches the critical angle, and takes an upward turn. The observer looking towards the ground sees the image of the trees, &c., inverted at his feet, as if in water, and looking direct at the trees sees them, also, first as if they were standing on the shores of the supposed lake. He hurries forward to slake his thirst, and finds he has been mocked by a phantom. The phenomenon of total refraction may be familiarly illustrated by filling a glass with water, and holding it above the level of the eye (fig. 9), in the direction EAC , when the whole under surface of the water is seen shining like polished silver, and a spoon, ACB , immersed in it will be reflected on the surface as on a mirror.

A ray of light refracted through a medium with parallel plane surfaces, will have its final direction after both refractions the same as before entering the medium. See fig. 10, in which $ABDE$ is the medium, and SET the ray of light. Again, a ray SB , fig. 11, incident on a compound medium consisting of two media, $ACDT$ and $DEGI$, of different refractive indices, and with parallel external surfaces, will emerge in a direction, HT , parallel to the incident ray. PP , QQ , and RR show the amount of refraction in each medium.

Diacustics.—The theory of diacustics, or caustics by refraction, corresponds closely with that of cataustics, or caustics by reflection. The refractive index being always the same, qr is to pr in a constant ratio, a formula the appearance of which indicates a conic section. For refraction from a denser medium into a rarer the diacustic

is an ellipse (fig. 16), and for refraction from a rarer medium into a denser it is a hyperbola (fig. 17), AN , the surface between the two media, being the direction of the curve and QCX its axis.

This explains the well-known fact of the apparent alteration of place in an image seen through water, when the ray passes from a denser to a rarer medium, and (fig. 16) the diacustic curve is an ellipse. For the eye sees by the rays which enter it, and judges (often wrongly, as in the mirage) of the existence of an object merely by the fact of rays diverging from it. If those rays are refracted by the water so that they come to the eye as they would from a nearer object in air, then the object in water is conceived as nearer than its true place. The image of a straight line PC , fig. 18 (say the blade of an oar, &c.) becomes pq (part of the line AQ of course), and is therefore apparently raised in the water. A shilling placed in a basin so that the side of the basin conceals it, may be rendered visible by pouring water into the basin; and so also do astronomers tell us we see a star for a perceptible length of time after it has actually sunk beneath the horizon. If we regard a long stick, PAQ , part of which, APQ , is under water, this appears, as every one knows, in the line Apg , and the stick seems broken at A .

Suppose q (fig. 19) to be a radiant point placed anywhere with respect to the refracting or reflecting surface ACB , and let AQ , FB be the caustic formed by the intersection of all the refracted or reflected rays, the eye being placed at E . Draw from E a tangent, EQ , to the caustic, produce it to C , and join QC . Then it is obvious that any small pencil, QC , $Q'C'$, will form a focus at q , whence it will diverge and fall upon the eye at E . As the eye shifts its place the apparent position of the object moves also; for the tangent EQ shifts its place on the caustic, and the point q (that is, the image) alters with every movement. Thus if we look through still water to the bottom of a pool this latter appears not flat but cup-shaped, and the more obliquely we look the nearer to the surface seems the bottom. A glance at fig. 16 shows that the more EPQ slopes the higher Y rises; that is, the nearer it comes to the surface, AN . The effect is as in fig. 20. From the eye, E , draw any line, EG , to the surface, $CBGK$. Draw RY parallel to EG and touching the branch, DYB , of the caustic having q for a radiant point, q being vertically below E . Produce YG to H , so that $GH = RY$; then H will be the image of the point q at the bottom belonging to the caustic DYB (dotted line). Now q is any point, and H , as we have seen, is its image, therefore as q varies so does H vary; and the locus or curve along which all the successive positions of H are found, will be the apparent shape of the bottom of the pool as viewed through the water. This locus is the curve DYH , having a basin-shaped curvature at D , a point of contrary flexure at F , and an asymptote, CGK , coinciding with the surface of the water.

The eye is elsewhere fully considered [see EYE]; for the purpose of this article all that is needed is to say that it is a nearly spherical chamber (fig. 21, c) with a transparent portion in front of a quicker curve, the *cornea*, a , inclosing a small space, A , filled with a thin fluid, behind which is the lens of the eye, b ; the chamber c is filled with a jelly-like *vitreous humour*, which assists in refraction, though the lens is the great refractor of the eye. The circular curtain or diaphragm which cuts off the outer circle of rays (to prevent aberration) is called the iris, and its section is seen at $\beta\gamma$; light therefore only enters the eye in the circular orifice between β and γ . A black coating (g) lines the eye all over except the front part, ceasing at the point i and the like; and at the back of the eye in front of the choroid (black) coat extends the expansion of fine nerve filaments, the *retina*, d , by means of which we see. The retina is an expansion of the optic nerve, which is seen entering the eye to the right. The whole eye is protected by a tough

membrane, the sclerotic, and the cornea is merely an altered transparent part of the sclerotic.

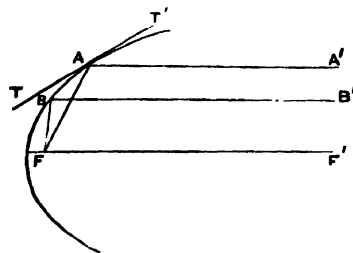
The eye is usually admirably suited to its work, but there are malformations of the eye as of all other bodily parts; and one of the most tiresome of these is an irregularity (*astigmatism*) in the shape of the cornea, which when it exceeds a certain narrow limit distorts the image and renders the eye almost useless. Sir G. B. Airy, the late astronomer-royal, had eyes the cornea of which curved more strongly in the vertical plane than in the horizontal, consequently a cylindrical lens was necessary to counteract this. In his case he had doubly concave glasses for his spectacles, one surface (the inner) spherical, the other cylindrical, and the defect was quite obviated. Many sufferers have benefited by Sir George Airy's persistent search after the means of improving his sight. The theory of the cylindrical lens may be thus explained. Let $A C B$, $D C' E$, represent the upper and under curved outline of such a cylindrical curve, $B E$, $A D$, $C C'$ being vertical outlines of it (fig. 22); now let $s s'$, $r r'$, $q q'$, $t t'$ be any luminous pencil of parallel rays contained in a parallelepiped infinitely thin, having its sides parallel to the axis. Any of the rays in the plane $A P S$, as $s r$, $s' r'$, will converge to or diverge from a point x , and all the rays of lower and lower planes—that is, all the rays falling on the lines $r q$, $r' q'$ —will have foci vertically below x , that is, will trace out the line $x y$ in the caustic surface $A F G D$, and the principal focus of the cylinder will be the line $F G$, whose distance from the vertex C is the same with the focal length of a spherical surface formed by the revolution of $A B$ about the axis $F C$. Therefore a cylindrical lens produces no convergence or divergence in parallel rays in the plane of its axis, but produces the same convergence or divergence as a spherical lens would do (the curvatures being equal) upon rays in a plane at right angles with the axis.

Mirrors, Lenses, and Instruments made of them; Telescopes, Microscopes, &c.—The general effect of convex lenses upon the natural eye is shown in figs. 23, 24. The interposition of a lens c spreads wider the angle between the extreme rays which enter the eye, for a straight line from r to e would fall within the broken line in fig. 24, and in fact $e p$ is parallel not to $r e$ but to $r c$, and $t q$ to $q c$; wherefore the angle or divergence being greater without the eye, so is it also greater within the eye, and the image appears larger. Consequently the further from the eye the lens is held the larger is the image, because the greater is its effect upon the divergence.

The image is observed to be inverted in the eye, and this being the normal state, images so seen by the retina are always read by the brain as erect; the reversal by the brain of the position of the image on the retina may therefore be put aside in the present article; it is a point of physiology rather than of optics. The effect of lenses, &c., upon images is well shown in figs. 25, 26, 27, 27a, where a double convex lens is seen to give an image on the far side and to invert the image (25), a double concave one (26) to give the image on the same side of the lens with the object, and direct; a convex reflector (27) gives a direct image beyond the reflector, and a concave reflector (27a) gives an inverted image within the reflector.

In all spherical mirrors, as is evident from what was said about the variation of focus for central and outer rays, the rays parallel to the axis converge only approximately to the principal focus, and reciprocally, when a source of light is placed in the focus, the reflected rays are not exactly parallel to the axis. But the conic section called a parabola has this property, that at any point in the curve, the line joining the focus and that point, and the line drawn through that point parallel to the axis of the parabola, make equal angles with the tangent. Thus in the annexed figure $F A$ and $A A'$ make equal angles with the

tangent $T T'$ at its point of contact A . The same thing would occur at B with the tangent at that point. Therefore if $F A$, $F B$ are rays of light, they are reflected along the parallel lines $A A'$, $B B'$, &c., all of them parallel to the axis. The parabolic form of mirror is therefore now always used in the best constructed passage lamps, train lamps, &c., the light being placed in the focus of the parabola.



Reflection from a Parabolic Mirror.

Details of telescopes and microscopes are given elsewhere [see TELESCOPE, MICROSCOPE]; the main principles are all that here concern us. In the astronomical telescope (fig. 28) or common refracting telescope, the lens which forms the image is called the *object-glass*, and that image is viewed by another lens, called the *eyeglass*. By this means the rays as they finally emerge are parallel, or very nearly so, and the image is distinctly seen. Both glasses are double convex in the ordinary telescope, and are separated by about the sum of their focal lengths. If, however, the eyeglass be concave instead of convex, then we have the Galileo telescope (fig. 29). Taking first the ordinary instrument (fig. 28), let $p q$ be the object. Draw $q o g$ through the centre of the object and eyeglass—this is the axis of the telescope. From p point in the object draw $p o p$ through the centre of the object-glass, o , meeting the line $q p$, which is a line let fall from q , the focus of the point q , and perpendicular to the axis, then $q p$ is the image of $q p$, for $p A$, $p B$, extreme rays from p , cross at p . The greater the power of the eyeglass compared with that of the object-glass, the greater is the magnifying power of the telescope. Pencils of rays will emerge from the eyeglass parallel to each other (as with fig. 24); that is, $a f$, $b e$ will be parallel to $p a$, $r a$, and the eye placed at e will receive the entire image. It is necessary, therefore, with convex single eye-pieces that the eye should not be allowed to approach nearer than the focus of the eyeglass. If the images are near, the focal length must be increased, and the glasses are separated in consequence by some sliding-tube arrangement, moved by the hand or by rackwork: the same arrangement is also necessary to adjust the telescope to short-sighted persons, who require the glasses brought nearer together, or for long-sighted persons, who require them more widely separated, for the same objects. The same explanation applies to the Galileo telescope (fig. 29), only here the image is viewed erect, and with the eye as close to the eyeglass as possible.

In the microscope (fig. 30), which is a telescope applied to viewing very near objects, the object-glass has its power greatly increased in comparison with that of the eyeglass.

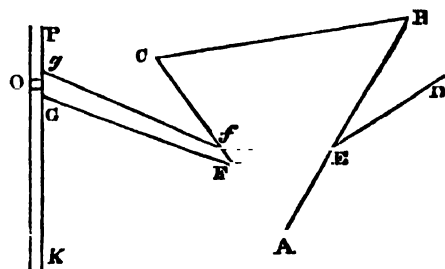
In reflecting telescopes (figs. 31, 32) the image is formed by a concave mirror, and viewed, as in the refracting telescope, through a convex or concave eyeglass; but since the head of the observer would intercept the whole of the incident light in small telescopes, and a great part of it in large ones, the axis of the reflector itself is sometimes turned a little obliquely so as to throw the image aside. Thus it can be viewed with little or no loss of light, though not without the inconvenience of a slight distortion, caused by the obliquity of the rays. This was the variety of telescope used by Sir William Herschel. Reflecting telescopes

are made of great size, and serve to study faint celestial objects when the light diffused by aberration is insensible, and the obliquity may therefore be neglected in practice. Newton was the inventor of them, and his mode of getting over the stoppage of rays by the head was to use a plane mirror, en (fig. 31), inclined at 45° to the axis, and to view with an eyeglass, o , the image caught in this mirror from the great reflector, A . The Gregorian reflecting telescope (fig. 32) has a small concave mirror instead of the oblique plane mirror, and this is placed at a distance from the large mirror rather more than the united focal lengths; hence the image, pg , formed in the focus of the great mirror, being at a distance from the small one greater than its focal length, another image is formed, as at rs , at or near the surface of the great mirror. In the centre of the latter is an aperture, so that this second image may be viewed by means of the eye-piece, g .

Colour: the Spectrum.—Hitherto refraction has been regarded merely as to its twisting the path of a ray of light. But it does more than this: it disperses it; that is to say, it separates it into its constituent rays. A ray of white light is thus found to be made up of many rays of various colours and various refrangibilities; these, therefore, separate under refraction of the whole ray. Such a dispersed and coloured image of a ray of light is called a *spectrum*. To display the spectrum, let OP (fig. 33) be a round hole in the closed shutter of a dark room. Let a sun-beam falling through or strike a screen, D , and a round image is formed, which becomes larger the further D is from OP . Now introduce the prism, ABC , and the beam is twisted aside along FGH . But here not a spot but a long streak is seen—namely, the spectrum, RV , the least refracted or lowest end of the spectrum being red, the most refracted or highest end being violet, and between these lie (red) orange, yellow, green, blue, indigo (violet), as they are usually distinguished. This streak, however, is found on delicate investigation to be made up of overlapping circles, images of the sun, as in fig. 37, each colour producing an image in its own tint, as indicated in fig. 36, and by reducing the size of the orifice, o , the circles may be made to appear as in fig. 37, row b . They may be conceived as separable into the row c , and if arising from a point, as a star, &c., without angular magnitude, they will be a series of points closely contiguous, displayed in an exaggerated separation by the row of points at d . If one of these circles—say a green one—be entrapped (fig. 33) by being allowed to pass by itself through a small hole, x , the rest of the spectrum being caught by the screen, then there will be no further spectrum made even if this green ray be caught upon the prism, bae , and twisted aside to r , but it will remain green, just as when it strikes the screen at the point a without the intervention of the prism. The solar spectrum may be recomposed into white light, as by two prisms, ABC , abc (fig. 34), which will be found to neutralize each other, and to transmit white light; or, as in fig. 35, it may be recomposed by a lens, D . Here TR , TD are parallel pencils of rays (say of red and violet), into which the incident beam, ST , is dispersed. These will be collected, after refraction, each in its own proper focus, as at F and G , after which each pencil diverges again, the former in a cone FH , the latter in a cone GH . If the screen be held at H , each of these pencils will paint on it a circle of its own colour. So with all other colours, and as a result all the rays of the spectrum will be concentrated on H . A circle of white light is produced, generally with a coloured fringe, due to a slightly imperfect overlapping of the image.

If the prism, ABC (in the subjoined figure), be turned gradually round its axis, presenting always to the incident light the same refracting angle, A , the spectrum, ag , may be made to descend towards K ; but after arriving at a certain point where the deviation, that is, the inclination of DE

produced to FG , is a minimum, it then reascends, and it is usual to make the chromatic experiments in this definite position of minimum deviation. This occurs when the position of the prism is such that the angles of incidence and emergence, or their complements, DEN , GFC , are equal to one another. The course of a ray after the second



refraction differs according to the media from which it passes and into which it enters. Let the ray, sc (fig. 12 in Plate), pass through a prism denser than the surrounding medium, and the ray is bent towards the thicker part of the prism, CP , CP' are perpendicular to the two surfaces of the prism, $s'c$ shows the refraction on entering, $s''c$ that on leaving; DT is therefore parallel to $s''c$. If the prism be rarer than the medium the contrary is the case (fig. 13).

To find in what direction a ray must be incident on the first surface so as to undergo the least possible deviation (figs. 14, 15), it is necessary to take such a position as that $s'c$, the direction of the once-refracted ray, shall bisect the angle PCP' ; and it will then be apparent from the figures that the angle at which DT leaves the prism is exactly equal to that at which $s'c$ enters it. The case is shown in fig. 14 for a prism rarer than the surrounding medium, and in fig. 15 for the more usual case of a prism denser than the surrounding medium. In each case the ray has to fall upon the point c , from the side of PC , furthest from the vertex of the prism.

There are several ways by which the angular diameter of the sun's image, which was shown in fig. 37 to be a source of confusion in the colours of the spectrum, can be diminished. One is by the apparatus of fig. 6, where a portion of the image only is allowed to proceed, and may be caught by a prism just before reaching c . Another is to use the image of the sun in the focus of a lens, instead of the true image shown in fig. 38. The rays are conveyed to F by the lens L , and afterwards diverge as if they emanated from an intensely bright luminous point placed at F ; and a screen with a small aperture at o being placed at a distance from it and close behind the screen, the prism ABC , then the spectrum rv , may be received on a screen again placed at a considerable distance behind the prism, each of whose points will be illuminated by rays of a very high degree of homogeneity and purity. By diminishing o and adjusting the lens this may be carried to any extent we please, but the intensity of the light is diminished as the purity of the colours is enhanced. Another way is shown in fig. 39, where vn , the spectrum, formed by a first refraction at the prism A , is received on a screen which intercepts the whole of it, except that particular colour we wish to insulate and purify, which is allowed to pass through the aperture mn . This ray is caught and again refracted by the second prism, n ; if it is not pure, it may be sifted by a second screen, and the resultant beam, p , will be purified in proportion as the distance is greater between the second prism and the screen.

It would be difficult, if not altogether impracticable, to judge of the *dispersive powers* of transparent media by measuring the length of the spectra which they produce in a prismatic form, in consequence of the indefiniteness of their *termini*. Fortunately, nature has herself furnished a

scale of definite limits in the beautiful discovery made by Wollaston and Fraunhofer of the existence in the solar spectrum of dark spaces, bands transverse to the length of the spectrum, and now generally designated Fraunhofer's lines.

These bands are best observable by forming the spectrum of a luminous line instead of a point, by means of a prism of great purity, and viewing it through a telescope of good magnifying power, though some of them may, when carefully pointed out, be recognized by the unassisted eye, and after one recognition are in future easily found.

It is thus seen that in the solar spectrum the colours are not continuous, but are broken by certain dark lines across it. Some of these abrupt changes are absolutely black, and they are distributed irregularly to the amount of some 3000 throughout its whole length. They are constant in the same part of the spectrum, and preserve invariably the same order and relations to each other, the same proportional breadth and degree of obscurity, provided solar light be used. To distinguish some fixed points among them Fraunhofer chose ten of the principal lines, marked A, *a*, B, C, D, E, *b*, F, G, H, as presenting the double advantage of being easily recognized, and of dividing the spectrum into convenient portions. The dark line, A (figs. 40, 42, Plate IV.), is at the extremity, and B in the middle of the red ray; C, at the boundary of the red and orange ray; D is found in the yellow ray, E in the green, F in the blue, G in the indigo, H in the violet. There are certain other noticeable dark lines, such as *a* in the red and *b* in the green. As in the solar spectrum the positions of the dark lines are fixed and definite, they are used for obtaining an exact determination of the refractive index of each colour. In the spectra of artificial lights and of the stars, the relative positions of the dark lines are varied. It has been observed in the solar spectrum that certain dark lines only appear as the sun nears the horizon, and others are strengthened and are also influenced by the state of the atmosphere. The fixed lines are due to the sun; the variable lines are due to the aqueous vapour in the air, and are termed telluric lines.

The apparatus employed for the study of the spectrum is termed a *spectroscope*. One form of spectroscope consists of three prisms, the dispersion being increased by each prism. The prisms are placed successively each in the position of minimum deviation for some definite ray. The light enters the first prism, through a telescope having at the eye-piece a slit, formed by two carefully worked parallel jaws, which move parallel to each other by a screw, and so form a narrow rectangular aperture. A second telescope views the spectrum as the dispersed ray leaves the third prism.

The light received from the heavenly bodies, when collected by the most powerful lenses, conveys little information beyond their form and colour. By the discovery of Kirchhoff the light itself furnishes trustworthy information of the chemical, and to some extent of the physical, condition of the immensely distant bodies from which it has emanated. Newton pointed out that the tints of the rainbow are the necessary elements of ordinary light, and that when white light passes through a glass prism it is decomposed into the same colours as the rainbow (forming the solar spectrum). Wollaston and Fraunhofer discovered that these rainbow colours which form the spectrum are not continuous, but are interrupted by a number of dark lines. These lines of darkness are the symbols in which the chemical constitution of the sun and stars is written. It was not until 1859 that Kirchhoff discovered the true nature of these lines, and applied his discovery to the dark lines of the solar spectrum, and ascertained that several of the chemical elements which exist on the earth—hydrogen, sodium, magnesium, iron, calcium, nickel, chromium, copper, zinc, barium, cobalt, titanium, and

aluminium—are present in the solar atmosphere. This discovery of Kirchhoff's has entirely modified the conceptions previously entertained regarding the constitution of the sun. According to Kirchhoff, the sun consists of a molten nucleus surrounded by a gaseous atmosphere of a lower temperature. The light of the nucleus would give a continuous spectrum, but having to pass through the photosphere, those rays of the nucleus which the photosphere emits are absorbed, and shaded or dark lines corresponding to the rays absorbed appear in the spectrum. When light which has emanated from different sources is decomposed by a prism, the spectra obtained may differ in several important respects from each other, and are arranged in three generic groups. In spectra of the *first order* the rainbow tints of the coloured band are unbroken by either dark or bright lines; such a spectrum (fig. 41) can only be obtained from light emitted by an opaque body, and almost certainly by matter in the solid or liquid state. A spectrum of this order affords no information of the chemical nature of the incandescent body from which the light comes. Such a spectrum is emitted by the white hot carbon points of the electric lamp, and by incandescent iron, lime, or magnesia. Spectra of the *second order* consist of *coloured lines* of light from luminous matter in a state of gas. It is only when a luminous body is free from the molecular conditions of solidity and fluidity that it has the power of radiating some coloured rays alone. Substances, when in a *state of gas*, may therefore be distinguished from each other by their spectra. Each element and every compound capable of becoming luminous in the gaseous state without suffering decomposition is therefore distinguished by a group of luminous lines peculiar to itself. Fig. 17 gives the spectrum of hydrogen. Fig. 46 shows the lines of the vapour of sodium, and fig. 48 those of oxygen. Therefore it is obvious that if the various groups of lines characterizing different terrestrial substances be ascertained, a comparison between these standard spectra and the spectra of light from an unknown source will at once show whether any of these terrestrial substances exist in the source of light by the identification of the position of the lines in the corresponding part of the spectrum. The *third order* of spectra consists of those of the light emitted from incandescent solid or liquid bodies, in which the continuity of the prismatic band of coloured light is broken and traversed by dark lines, as in fig. 45. These dark lines or spaces are not produced by the source of the light; they indicate the vapours of various substances through which the light has passed on its way, and which have robbed the light by the absorption of certain definite colours or rates of vibration. Such spectra are formed by the light of the sun and stars, as in figs. 42, 43, and 44.

Thus Kirchhoff has demonstrated that if the vapours of terrestrial substances come between the eye and an incandescent body, they cause by absorption groups of dark lines, and further, that the group of *dark lines* produced by each such vapour is identical in the number of lines and their position in the spectrum with the group of *bright lines* of which the light of the vapour of that substance when it is luminous consists. Thus fig. 46 shows the yellow lines of sodium thrown upon the incandescent points of carbon in the electric lamp; but when a piece of metallic sodium is introduced into the electric lamp, and becomes converted into vapour by the heat, through which the light of the carbon has to pass, the sodium vapour absorbs and quenches the light that it emits when luminous, and a black line is produced (fig. 45) exactly in the place of the bright yellow line. Kirchhoff by this discovery has therefore furnished a means of interpreting the dark lines of the solar spectrum. For this purpose it is necessary to compare the bright lines in the spectra of the light of terrestrial substances, when in the *state of gas*, with the dark lines of the solar spectrum, so that when a group of

bright lines coincides with a similar group of dark lines, it becomes certain that the terrestrial substance producing the bright lines is present in the atmosphere of the sun in the form of gas, as no other substance, by its peculiar power of absorption, can produce that particular group of dark lines. The spectra of the moon and planets, since they shine by reflecting the sun's light, resemble the solar spectrum. The fixed stars, though immensely more remote, are original sources of light, and therefore their spectra furnish fuller indications of their nature.

The result of numerous investigations of the spectra of the fixed stars is that in structure the brightest of them resemble the sun. Their light, like that of the sun, emanates from intensely hot matter, and passes through an atmosphere of absorbent vapours. The terrestrial elements which appear most widely diffused through the stars, namely, hydrogen, sodium, iron, and magnesium, are those which are essential to life as it exists upon the earth, and hydrogen, sodium, and magnesium represent the ocean, an essential part of a world constituted like the earth. Huggins, who has examined the spectra of the nebulae, finds that they consist generally of bright lines, like the spectra of ignited gases, as shown in fig. 49, and in this respect are totally distinct from the spectra of the sun and stars, which consist of a luminous ground intersected by dark lines. It is therefore probable that the nebulae are masses of glowing gas.

The phenomena of **CALORESCENCE**, or raising the rapidity of vibration of rays beyond the spectrum, so that they become visible, and of **FLUORESCENCE**, or lowering the rapidity of the "dark rays" beyond the other end of the spectrum, so that they also may be seen, prove that our eyes cannot see the whole of the spectrum, and hint at glazes of colour which may be visible to other beings than ourselves. They are treated of separately elsewhere, and also for the whole doctrine of **COLOR** the reader is referred to the article under that heading, and to the Plates accompanying it.

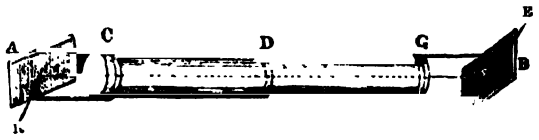
There are two phenomena of wave motion affecting light which have been separately treated elsewhere in this work. These are **INTERFERENCE**, where opposing systems of waves neutralize or partly neutralize each other, and in the case of light produce small intervals of darkness, and **DIFFRACTION**, or inflection, that curving round behind an obstacle so characteristic of a stream of water, as has already been remarked.

It has been said that light waves are produced by the vibration of the ether molecules across the path of the wave, the wave extending in straight lines on every side from the luminous object; but an important addition must be made to this statement. The vibrations of the ether molecules occur in all directions round the line of propagation, and could we see one set of them as a physical object we should have the image of a circular disc formed by their rapid motion, the line of the wave passing through the centre of the disc. Now it was found by Huyghens and Newton that Iceland spar, which has the property of doubly refracting light, so that one object is shown as two if seen through it (in any direction but that of the optic axis), splits the vibrating molecules, so to speak, and sends out the divided beam with new properties. Each half of the beam in fact is like a water wave, with particles vibrating in one direction only, say the perpendicular, across the path of the wave, and not, as in ordinary light, vibrating in all directions. The spar acts as a perpendicular grating might be supposed to do, and allows none but perpendicularly vibrating waves to pass it. A second piece of spar can therefore be so adjusted as to stop all perpendicularly vibrating waves, and that means, of course, stoppage of light altogether. This experiment is particularly well shown in the case of plates of tourmaline, which when crossed are almost absolutely opaque, though quite

transparent when used singly or in the same direction. This two-sidedness so strongly resembles the polarity of a magnet that Newton named it the **POLARIZATION OF LIGHT**. It has proved a wonderful means of discovering the hidden structure of bodies.

Refraction is not the only mode by which light is polarized. If it be reflected from any surface at a particular angle—differing for different substances—it undergoes polarization, and is said to be polarized by reflection. Indeed, in all cases of reflection there is some light thus modified, some portion of it falling upon the reflecting surface at the required angle, and at other angles a portion of it is polarized, in degree, according as its angle of incidence approaches the polarizing angle on either side.

The phenomena of polarization by reflection may be conveniently shown by means of an apparatus like that here figured, in which **C D** is a brass tube, having at one



end of it a plate of glass **A**, blackened on the external surface, and capable of turning round on an axis, so that it may form different angles with the axis of the tube. **D G** is a similar tube, but of a smaller diameter than the other, and carrying also a glass plate **B**. The tube **D G** may be pushed into the other, **C D**; and by turning the one or the other round, the two glasses may be brought to any position with regard to each other. Supposing these reflectors fixed at an angle of $35^{\circ} 25'$ with the axis of the compound tube, let a ray of light, **R**, from a candle or a hole in the window-shutter, fall upon it, and adjust the apparatus to such a position that the ray shall be reflected along the axis of the tube. The tube which carries **A** is then fixed, leaving that which carries **B** movable within it. The light which is reflected from **A**, after traversing the axis of the tube, will fall upon **B**, and be again reflected. It may then be received by the eye or upon a screen. Let the tube **D G** be turned round within **C D**, carrying with it its reflector **B**, which, in its revolution, will always preserve the same inclination to the axis of the tube. If we attend to the light reflected from **B**, it will be observed in the course of the revolution constantly to vary in intensity; at two opposite points it will acquire a maximum intensity, and at two other opposite points, intermediate between these, it will entirely disappear. On comparing the positions of the reflecting planes at the concurrence of these phases, it will be found that the intensity of the light is greatest when the planes are parallel, and that there is no reflection when the planes are at right angles to each other. It thus appears that a ray of light reflected from the surface of glass, at this particular angle, is incapable of being reflected a second time from a similar surface perpendicular to the former at an equal angle of incidence. It has in fact ceased to be subject to the ordinary law of reflection in a perpendicular plane, at the same time that it preserves its property of being reflected in the same plane.

If a plate of tourmaline be substituted for **B**, the light from **A** will be absorbed or transmitted according to the position which the axis of the crystal, from which the plate was cut, bears to the reflecting plane. If this axis be parallel to **A**, the whole of the reflected light will be transmitted through the plate; but if the plate be turned round in its own plane until the axis becomes perpendicular to the reflecting plane, no portion of the light will be transmitted.

The most interesting, and by far the most splendid, phenomena which are afforded by polarized light, are the vivid and gorgeous colours developed by the transmission

of light through transparent plates that possess the power of double refraction. If a ray which has been polarized in any of the ways described, be made to traverse a thin plate of mica, which is perfectly diaphanous and colourless to common light, and be received upon a plate of glass in a particular position, the ray will appear coloured in the most splendid manner with different tints, depending upon the thickness of the plate and its inclination.

The most convenient mode of making experiments of this class is by means of the instrument shown in the figure. This instrument was first suggested by M. Biot, and is called a *polariscope*. It consists of two uprights inserted into a sole, and supporting a frame A B, containing a plate of glass. Two circular plates rest on the pillars, and have circular apertures in the middle about 3 inches in diameter; a ring, movable round a circular projection on the upper plate, supports two pillars, between which rests, by means of screws, a frame like A B, but somewhat smaller, and also containing a glass plate. The circular plates before mentioned are divided into degrees round their edges. A plate of glass rests over the aperture in the lower round plate to serve as a stage, on which objects to be submitted to the action of polarized light are placed. Both surfaces of the lower plate, A B, are made available to polarize light by reflection, by having a horizontal mirror on the sole of the instrument to reflect upwards such rays as a b c.

The plate next the eye is always termed the *analyzing plate*, because its use is to analyze, or separate into parts, the light transmitted through any body that may be placed upon the stage of the polariscope between the eye and the *polarizing plate*, the use of which is to furnish us with a broad and bright beam of polarized light by reflection.

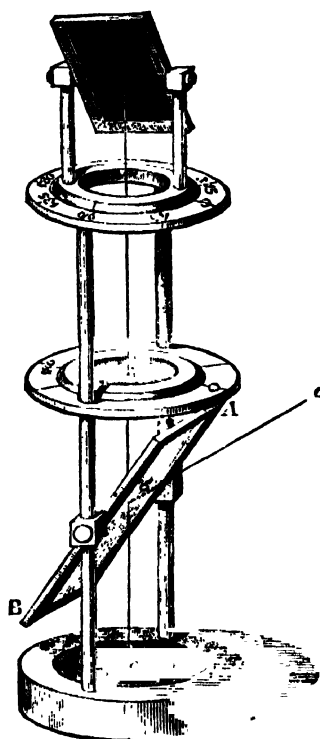
In using the polariscope, the source of light may be the sun's rays, diffused daylight, or still better, the light of a lamp or candle provided with a tissue-paper or ground-glass shade. Supposing the polarizing plate properly adjusted, to make the light reflected upon its surface traverse the instrument till it meets the *analyzing plate*, and suppose that the index is placed at zero of the upper graduated circle; if a film of selenite be placed on the stage, its image will be seen of a tint varying with the thickness of the film. If it be slowly turned round, the colour will gradually diminish in brilliancy, and ultimately vanish. Continue to turn it round, and the colour will gradually reappear, and attain finally its primitive brilliancy. Continuing the rotation, the colour again lessens and disappears. There are thus two points in the revolution of maximum brilliancy, and two where no colour is perceived; and we find that the planes of these points—

the point of greatest intensity and the vanishing point—are inclined to each other 45° .

Again, supposing the instrument adjusted as at the beginning of the experiment, let the film of selenite be fixed; and suppose its thickness to be such that its tint appears red; when its red image is visible in the analyzing plate, slowly revolve the latter, noticing the arcs of rotation on the graduated circle. It will be observed that the red colour of the reflected image gradually lessens, and when the analyzing plate has moved through an arc of 45° , it will disappear—by continuing the rotation the film will gradually assume a green colour, complementary to the red, and will attain its greatest brightness at 90° . Through the next arc of 45° the green vanishes, and 135° being passed, the red reappears, attaining its most vivid state at 180° . The same phases are repeated during the succeeding motion through arcs of 45° till the whole revolution is completed, when the image is red as at first. If the selenite be taken at such a thickness as to afford other tints, the complementary colours will still be found: that is, the colours at 0° and at 90° , or at 180° and 270° will invariably be such that, being united, they would constitute white light. Instead of using plates of different thicknesses to produce different tints, the same plate may be employed inclined at different angles to the polarized ray. This causes the ray to traverse the plate obliquely, and in fact amounts to an alteration in thickness.

From this combined experiment—and it is only one of a class—it then appears, that when the film alone revolves, only *one colour* is seen—the film being of uniform thickness; but when the analyzing plate revolves, *two colours* are seen, one during each half of its revolution.

The action of polarized light is, if possible, still more interesting, in the evidence which it gives of the internal constitution of crystals of the different systems. In the experiments above described a pencil of parallel rays traverses the film of crystal perpendicularly to its faces, and as all parts of the film act in the same manner there is everywhere the same tint. But when the incident rays traverse the plate under different angles, which is the same as if they traversed plates of different thicknesses, coloured rings are formed. These can best be observed by placing the plate of crystal to be examined between two plates of tourmaline (cut parallel to the axis), one of which acts as polarizer and the other as analyzer. They may be so arranged that their axes are either parallel or at right angles. The crystal to be examined being fixed between the two tourmalines, is held in front of the eye, so as to be viewed by transmitted light. It must be recollected that these films are now traversed by a converging conical pencil of rays whose apex is the eye of the observer. It follows that the virtual thickness of the film which the rays traverse increases with their divergence, but for rays of the same obliquity this thickness is the same, consequently the same colours will be produced at the same distance from the axis, and they are therefore arranged in circles round the axis of the crystal. If a rhomb of Iceland spar, with the apices of the obtuse angles terminating its axis cut off, and the triangular faces thus left polished, be placed between the tourmalines a beautiful series of coloured rings, intersected by a black cross, will appear when the axes of the analyzing and polarizing plates are at right angles to each other. The colours are the same as those in Newton's table, and consequently the same as the system of rings seen by reflection from the film of air between a lens and a flat plate of glass. If we turn round the analyzing plate, so that the axes of the tourmalines are parallel, these rings will be replaced by another set complementary to them in colour, and the black cross by a white one. These phases are represented in figs. 50 and 52, Plate V. The arms of the black cross are parallel to the optic axis of each of the tourmalines, and are due to absorption of the polarized



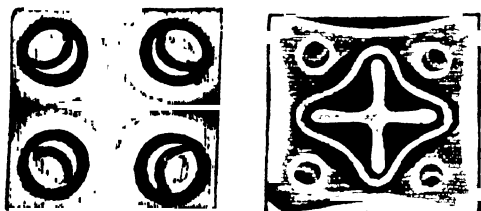
light in these directions. When the axes are parallel the vibrations are transmitted, and hence the white cross.

If the crystal belong to any of the more complex systems—that is, have two axes of double refraction, as nitre, topaz, sulphate of nickel, carbonate of soda, and the like—a double system of rings is visible, when polarized light is transmitted; these rings uniting form a beautiful curved figure, such as is represented in fig. 51, which is the appearance seen with nitre, when the axes of the two tourmalines are at right angles to each other. On turning the crystal without altering the tourmalines fig. 53 is seen. The curves are crossed by two bands, which are black or white, according to the position of the analyzing plate.

In various crystallized bodies, where the inclination of the resultant axes is large, the two systems of rings cannot at once be seen; we can only see one of the systems, that is, one half, or the portion round one axis, as in fig. 54, which shows the appearance presented by arragonite.

When a thin plate of mica, making an angle of 45° with the plane of polarization, is turned about its axis 45° so as to bring its principal section into the plane of polarization of the incident beam, the dark band coincides in direction with the incident beam, and is visibly prolonged (see fig. 55) and surrounded by a set of broad vivid coloured rings of an elliptic or oval form divided into two portions, the dark band passing through the pole about which the oval rings are formed as a centre.

For instance, ordinary glass is not endowed with the power of double refraction, but it may acquire this property if by any cause its elasticity is more modified in one direction than in another. To show this it may be strongly compressed in one direction only, or it may be bent by the application of force, or cooled after having been heated, so as to set up an internal strain. If the glass is then traversed by a beam of polarized light, colour effects are obtained entirely similar to those described as produced by double refracting crystals, except that they are susceptible of far greater variety according as the shape of the plates of glass and the degree of tension in their particles. Of the annexed figures the first represents the appearance



presented by a cube of unannealed glass, and the second that of a plate of the same material.

This property of polarization by reflection or refraction has been ascertained to belong to rays of heat as well as those of light, and forms one of the links which connect the various forces of nature and indicate their essential unity.

By means of the property possessed by polarized light, of developing these coloured rings, which always in tint and arrangement bear a constant relation to the physical structure of the crystal producing them, we are enabled frequently to make out the existence of peculiar arrangements of molecular structure, and thus acquire a new means of investigating the internal arrangement of some of those simple but wonderful structures presented to us so liberally in both the organic and inorganic world.

Chemical Action of Light.—There are several cases in which light exerts direct chemical action without its being attributable to the heat which usually accompanies it when intense. Thus, if a mixture of equal volumes of chlorine and hydrogen gases be kept in the dark, no combination

takes place between them; but in the light of day they unite slowly, and form hydrochloric acid gas; while if exposed to the direct solar rays the combination occurs instantaneously, and with loud explosion. Chlorine gas and oxide of carbon, when mixed, unite by the direct action of the sun's rays. If colourless nitric acid be exposed to the sun's rays it becomes yellow, and afterwards red, and a quantity of oxygen is liberated by the partial decomposition effected by the solar rays. The action of light on the chloride and other salts of silver is very remarkable. These substances, as long as they are kept from the light, even though exposed to heat, remain perfectly colourless; but the sun's rays, and even diffused daylight, by their reducing action, blacken them speedily. See PHOTOGRAPHY.

LIGHTFOOT, JOHN, D.D., an early English Hebraist, was the son of Thomas Lightfoot, vicar of Uttoxeter, and was born at Stoke-upon-Trent, 29th March, 1602. He was educated at Morton Green, in Cheshire, and at Christ's College, Cambridge, and after taking orders was appointed curate at Norton under Hales in Shropshire. Here he formed an intimacy with Sir Rowland Cotton, who induced him to study Hebrew, and in 1630 presented him to the living of Ashley in Staffordshire. Here Lightfoot remained twelve years, devoting himself assiduously to his pastoral duties and his biblical studies, afterwards removing to London, where he became minister of St. Bartholomew's Church, near the Exchange. He was one of the original members of the Westminster Assembly, in the proceedings of which he took a prominent part, and he has left a useful account of its proceedings from 1st January, 1643, to 31st December, 1644. In 1644 he was made master of Catherine Hall at Cambridge, and rector of Much-Munden, and he retained both these appointments until his death. In 1655 he was chosen vice-chancellor of the University of Cambridge, but continued to reside at Munden. He was afterwards collated to a prebendal stall at Ely, at which place he died, 6th December, 1675. The most important of his works is the "*Horæ Hebraicæ et Talmudicæ*." His complete works were published in two vols. folio by Bright and Stryppe in 1684, and they have passed through several editions. One of the best is that of Pitman, thirteen vols. 8vo (London, 1822-25). The "*Horæ Hebraicæ et Talmudicæ*," edited by R. Gandell, was published in four vols. at Oxford in 1859.

LIGHTHOUSES are buildings erected along the seashore, or upon rocks, from which lights are exhibited at night for the direction of mariners. Floating lights perform a similar office, being shown from the masts of vessels moored in certain positions, generally as beacons, to enable ships to avoid shoals or sunken rocks in the estuaries of great rivers.

The most celebrated lighthouse of ancient times was that erected about 283 B.C., in the reign of Ptolemy Philadelphos, on the island of Pharos, opposite to Alexandria, which endured for 1600 years, and has given rise to the use of the term *pharology* as descriptive of the modern system of lighthouse economy in all its details. The celebrated Colossus of Rhodes has also been supposed by some to have had a light at its summit, or in its hand, but of this there is no certain evidence. There are ruins of many towers on the coasts of Great Britain and on the shores of Europe which are believed to be the remains of ancient lighthouses. The tower at Corunna, which now bears one of the finest of modern lights, is said to have been erected by the Emperor Trajan.

The erection of lighthouses in this country has not proceeded upon any systematic plan, but in nearly every case they have been constructed simply because of the disastrous losses that had occurred for want of them. The character of the buildings in which the beacon lights are placed is dependent upon their situation. They may be placed on lofty cliffs at a considerable height above the sea, as at

Flamborough Head and Beachy Head, in which case the building itself need not be lofty, but only of such peculiar shape and colour as to make it conspicuous from the sea by daylight, and to make it easily distinguishable from the dwelling-houses or other buildings in its neighbourhood. When they are situated on low promontories but little above the sea-level, as on the flat beds of single at Orfordness and Dungeness, they require to be raised to a considerable elevation, that the light by night, and the building by day, may be discernible at long distances from the land. Being of necessity placed in exposed situations, they require to be strongly and solidly constructed; but for the great triumphs of engineering skill we must turn to the lighthouses fixed on isolated and even sunken rocks, of which the Eddystone in the English Channel is the best known, though by no means the most striking example. In the erection of these towers the whole skill and science of the engineer must be expended not only to secure for them a firm foundation, but to impart to the entire structure sufficient strength to enable them to stand the mighty shocks of the waves.

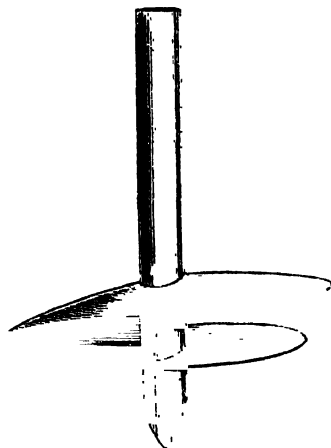
In the article HARBOUR some facts are given illustrative of the tremendous power exercised by the waves during storms on the coast of Wick in Scotland, and observations carried out in other portions of the United Kingdom have shown that a similar force is exerted in many other places. In some experiments carried out at the Skerryvore Rocks, situated at a distance of 12 miles from the island of Tyree in Argyshire, and wholly open to the Atlantic, the apparatus constructed by Thomas Stevenson to register the striking force of the waves showed an average result for the winter months of 1844-45 of 2086 lbs. per square foot. The greatest force registered was on the 29th March, 1845, during a westerly gale, when a pressure of 6083 lbs. per square foot was excited. Wave power equally great has been observed at the Bishop Rock, lying off the coast of the Scilly Islands, and on 30th January, 1860, a storm wave shook the lighthouse erected there and tore away the bell, weighing 3 cwt., from its support at the top of the tower, more than 100 feet above the sea.

In the erection of towers designed to withstand the force of storms like these they are always made of enormous weight, and the portion of the tower which will be exposed to the heaviest shocks is made solid throughout. In the earliest towers the stones were bound together by means of wooden, stone, or metal plugs, but in the improved methods now adopted the stones of each course are dovetailed together laterally and vertically, so that the use of such plugs is needless. On the upper face and at one end of each block is a dovetailed projection, and on the other face and at the other end is a dovetailed indentation. The upper and under dovetails are made just to fall into each other, and when the hydraulic cement is placed upon the surface it so locks the dovetailing that the stones cannot be separated without breaking.

Among the more celebrated lighthouses of modern times are the Eddystone Lighthouse, opposite to Plymouth Sound; the Bell Rock Lighthouse, opposite to the Frith of Tay; the Skerryvore Lighthouse, completed in 1844; the Bishop Rock Lighthouse, already referred to in this notice; the Wolf Rock Lighthouse, Land's End, completed in 1870; the Dhu Heartach Rock Lighthouse, completed in 1872; and the Chicken Rock Lighthouse, which stands a mile off the Calf of Man, and was completed in 1874. The EDDYSTONE and BELL ROCK lighthouses have been already described, and illustrations are given in Plate I. of the present article of the Skerryvore, Wolf, and Chicken Rock lighthouses, together with sections of their courses at different elevations.

In some places iron may be employed with advantage instead of masonry, and towers composed of iron plates, bolted together, after the designs of Alexander Gordon, have been erected at Jamaica, Bermuda, the Bahamas, and other

places. They are well adapted for positions and countries where skilled labour and suitable materials are wanting. Another description of iron lighthouse, which has been found exceedingly useful in many places, is that known as the *screw pile*, designed by the celebrated blind engineer, Alexander Mitchell. This inventor's attention was directed to the subject by the desire to improve the fastening of mooring chains or anchors. He conceived the idea of applying the broad threads of a screw round the periphery of a central bar, and by screwing this pile into the sandy soil in a harbour he thought he could cause it to take such a grasp of the soil as to enable it to form a fixed point, to which mooring buoys could be safely attached. He carried this idea into execution, and was completely successful. By a natural train of thought he was induced to apply his invention to the sinking of piles in loose and sandy soils for the construction of beacons, piers, &c. Such was the success of this application that, in 1838, the corporation of Trinity House ordered a lighthouse to be erected on screw piles on the shifting Maplin Sands, in the estuary of the Thames. Nine shafts of wrought-iron were screwed into the sand to a depth of 22 feet, eight forming an octagon, the ninth in the centre. These screws, as shown in annexed cut, consist



Mitchell's Screw Pile.

of a single turn of a flange 4 feet in diameter at the lower end of the pile, and they were fixed in nine consecutive days, under the personal direction of the inventor. They were secured in place and bound together by suitable ties, and upon them was reared the superstructure, consisting of a living-room for the light-keepers, a store-room for coal and water, and the lantern. Similar buildings have been constructed at Fleetwood, Belfast, and many other places. One great advantage of this plan is that the under piles, on which the structure is erected, present an exceedingly small surface for the waves or wind to act upon. When erected in sheltered situations they have answered all their requirements, but one or two attempts that have been made to erect pile lighthouses in exposed situations have resulted in disaster, and have prevented any further development of the principle.

Light-ships.—Floating lights are never placed where a suitable position can be had for a fixed building—the reasons being that their lights must be comparatively small; that they are liable to drag their anchors in violent storms, and thus, by their change of position, to mislead instead of guiding, although this does not often happen; that they are much more expensive, requiring eleven men to work them, whereas three men are all that are necessary to occupy

a first-class light-tower—the cost of management of the former being from £1100 to £1300 per annum, and of the latter £350; also, that they are much more troublesome, requiring to be periodically taken into dock to refit, on which occasions they have to be replaced by similar vessels. There are fifty-four floating lights on the coasts of the United Kingdom, being a greater number than appear in any other country, the United States of America having only seventeen. These craft are in general ordinary-shaped vessels, and are now expressly built for the purpose. Light-vessels are ordinarily painted of a dark red colour, to make them readily distinguishable from all other craft, and that colour, which is the opposite of green, being more conspicuous than any other on the surface of the water. The Irish light-ships, however, are painted black with a white streak, and those of the United States cream-colour or white. Light-ships are generally moored with mushroom anchors; some with single cables, others with what is called a span; that is, two anchors laid down with a long stretch of cable between them, the light-ship riding by a 60-fathom cable from the centre. They do not pull directly upon their anchors when moored with a single cable, but pay out a sufficient length to enable it to lie upon the bottom, the length paid out being regulated by the weather. The greatest depth of water in which any of these vessels ride is about 10 fathoms, which is the case with the one at the station of the Seven Stones, between the Scilly Islands and Cornwall. During the daytime the light-ship is distinguished by an open globe or ball in framework carried at the top of the mast, and this is in some instances surmounted by a special mark, as in the case of the *Wendell* off the south end of Hasborough Sand, which has a diamond, or the *Last Goodwin*, which has a half diamond over a diamond. Until 1807 the only lights used by light-vessels were small lanterns, which were swung from the ends of the yard-arms, but in that year Robert Stevenson introduced a lantern, which was constructed with a copper tube in the centre, through which was passed the vessel's mast, the lights being placed all round. This form of lantern is now universally adopted, and by means of suitable machinery a moving light can be secured if desired. It is lowered during the daytime into the deck-house, and the lamps are there cleaned and tended. A plan and elevation of the lantern are given in figs. 3 and 4, Plate III. Light-vessels on the English shores are generally provided with gongs of Chinese manufacture, which are sounded in foggy weather, and they are able to signal ships which are standing into danger by firing guns, and can sometimes communicate with the shore by means of the electric telegraph, the wire being carried down the mooring-cable, though this system has been too lately adopted to be thoroughly tested.

The whole of the duties connected with the lighting and buoying the coast of England and Wales are now discharged by the authorities at the Trinity House. [See TRINITY HOUSE.] In Scotland they are under the management of the Commissioners for the Northern Lighthouses; and in Ireland, under the Commissioners of Irish Lights. There is a second class of lighthouses, consisting of local or harbour lights, which are managed by corporations and local trustees, subject to the general control of the Trinity Board. The lighthouses are maintained by dues levied on all vessels with cargo or passengers which use the harbours, &c., of the United Kingdom, at so much per ton per vessel, according to the number of lighthouses passed. According to the latest returns, there are 520 lighthouses and light-ships in the United Kingdom, the coast-line being 9383 miles. Of these, England and Wales, with 2405 miles, have 287; Scotland, with 4460 miles, 136; and Ireland, with 2518 miles, 97. The expense of the maintenance of these various lights, together with the different buoys and sea-marks, is something like £70,000 per annum. The system of France, with a coast-line of 2760 miles, is

more complete than that of England, inasmuch as the light of every lighthouse crosses that of the one next adjacent, so that the whole forms a kind of chain of lights. The whole of the French coast, however, borders immediately upon crowded maritime highways, and is much less indented than our own with friths, headlands, bays, promontories, and estuaries. The lights round the coast of the United Kingdom run on an average to about one to every 18 miles of coast, but at some dangerous or much-frequented localities they are of course far more thickly congregated.

A principal object in the establishment of lighthouses is to give intimation to vessels approaching the coast during the night as to their position. It is therefore of importance that the lights exhibited on the same line of coast should have some essential differences, so as to be readily distinguished by mariners. The different appearances thus required are given by having two lights placed either vertically or horizontally with respect to each other, or even three lights, as at the Casket Rocks, near Alderney; or by causing the lights to revolve or to appear only at certain intervals, and to remain in sight only for a given number of seconds at each appearance; or by the employment of lamps of different colours, as in some of the harbour lights, which do not require to be seen at a great distance.

It will thus be seen that in order to navigate his ship safely near the coast at night, the mariner not only looks out for lighthouses, but must discriminate between one and another. To aid in this discrimination, a list is published giving full particulars concerning each one of the 280 lights—the name of the light, the latitude and longitude, the number and colours of the lights, the distance they are visible, height of lantern, building, &c., and when erected, with other particulars.

It has been suggested that by a system of dot and dash eclipses each lighthouse might be able to spell its own name or initial letter, and one or two lights have been designed of this description. On paper this system looks admirable, but practical men, who are acquainted with the difficulty often experienced of timing a light at sea in rough weather, regard the proposal with great disfavour. A captain who is compelled to stand on a steamer's bridge, in a sea so rough that he is obliged to hold on with both hands to keep himself from going overboard, and is able to catch a glimpse of the light only as his vessel lifts on a wave, is very unfavourably situated for counting dot and dash eclipses. The better plan appears to be that in present use, by which no two lights on the same stretch of coast are allowed to have the same characteristics.

Lighthouse Illumination.—The mode of illumination adopted in the lighthouses of the ancients seems to have been either an open wood or coal fire, or the combustion of torches dipped in tar. No improvement was made in these systems for several hundred years, and so recently as the latter half of the last century the sea-lights of this country consisted of open coal fires, with the exception of the Eddystone, which then used to exhibit a chandelier of twenty-four wax candles, and the Liverpool lighthouses, which had oil lamps with rude reflectors, represented in figs. 1 and 2, Plate III. The use of coal fires indeed lingered on until the beginning of the present century, and the last was not extinguished until 1823, at St. Bee's Head, Cumberland. The use of oil lamps with reflectors is said to have been introduced by William Hutchinson, dock-master of Liverpool, probably in 1763, and certainly before 1777, in which year he published his "Practical Seaman-ship," in which he describes the apparatus used. Metal reflectors of silvered copper were constructed by M. Lenoir for lighthouse use, under the direction of the Chevalier Borda, in 1780. One of these, of a paraboloid form, is shown in fig. 1, Plate II., which explains its action in throwing the diverging rays of the lamp into a beam of

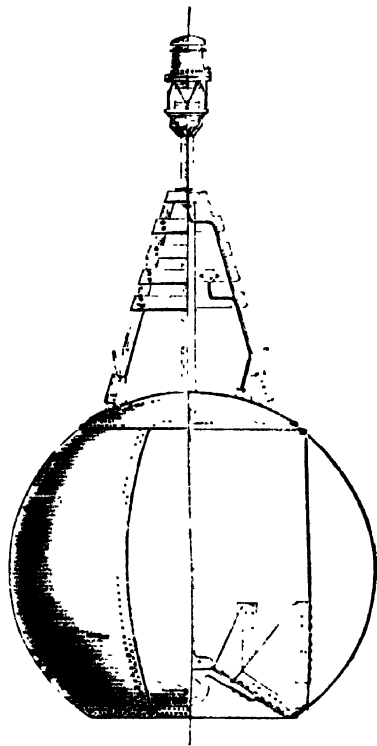
parallel rays, but also showing how a large portion of the light which radiates forward is scattered and lost. To remedy this defect the holophotal reflector was invented by Thomas Stevenson in 1849. This is shown in fig. 2, in which *aaa* is a section of a paraboloid reflector, which at once reflects part of the diverging rays into a parallel beam, *bbb*, a hemispheric reflector, which returns all the light that radiates backwards from the lamp, and *l* is a glass lens for refracting into a parallel beam the central rays of light. The use of dioptric lights, in which the beam is intensified by means of an arrangement of lenses in front, was suggested by Smeaton in 1759, and they were actually employed in the Portland Lighthouse about 1789; but from some mismanagement they had fallen into disfavour until about 1822, when they were revived and improved in France by Augustin Fresnel. Leonor Fresnel, T. Stevenson, Arago, Faraday, and others afterwards contributed to the improvement of the invention; and oil lighting has since been perfected to the utmost, it is believed, so far as the lenticular apparatus is concerned, by the dioptric holophotal plan invented by Thomas Stevenson in 1850, which is very extensively adopted both in Europe and America. This is represented in fig. 3, in which *l l* is the lens which parallelizes the central portion of the diverging rays; *pp* are a set of totally reflecting annular glass prisms, which reflect the lateral parts of the light radiating forwards; and *aaa* a spherical mirror composed entirely of prismatic rings of glass, so formed as to reflect totally the light that radiates in a backward direction from the lamp. In fig. 4 *abc* is one of those prisms, and *f r r' f'* is the course of a ray.

Fresnel's first-order revolving apparatus, as made for Skerryvore Lighthouse, is shown in fig. 5. The light is received and collected into eight horizontal beams by the principal lenses, *l l*. The light which would escape above these is collected into eight inclined beams by small lenses, *aa*, and reflected to the horizon by inclined mirrors, *bb*. The lower part of the light is sent equally to all parts of the horizon by prismatic rings of glass, *pp*, which act as mirrors. Fig. 6 represents a first-class holophotal revolving apparatus designed by Thomas Stevenson. The central part of the light is collected into eight horizontal beams by lenses, *l l*. The light which passes above and below these is received and collected into horizontal beams by prismatic reflectors, *ppp*. Fig. 7 shows management of reflecting prisms for an apparant light, when the light itself is on shore, and is only reflected from suitable apparatus fixed on the beacon.

Fresnel's "bee-hive" apparatus, shown in figs. 8 and 9, is intended for fixed lights which have to be constantly in sight all round the horizon. *rr* are lenticular rings acting by refraction, and *pp* prismatic rings acting by total reflection.

In the great majority of modern lighthouses the light is obtained by means of oil lamps of various constructions. Formerly in England only sperm oil was used, but in 1816 the lamps were altered and adapted for the burning of colza or refined rape-seed oil, which had some advantages as an illuminating material and only cost half as much as sperm oil. Colza oil continued to be the only material used until 1874, when the Board of Trade sanctioned the use of mineral oil, which has since been adopted in many places. The mineral oil chiefly employed is that known as Scotch paraffin, the best quality only being used. It requires a large supply of air for its perfect combustion, but in the Trinity House Lighthouse lamps, which have been adapted to the burning of paraffin oil, this is secured, and a very brilliant flame is the result. In 1868 Captain Doty introduced his multiple wick burner, and these are now made with six circular wicks, one within the other, which show an exceedingly brilliant flame. The three innermost wicks can be covered with a metal cap and the outer ones only lighted when a moderate light is required, the full number being used in dull and foggy weather.

Attempts have several times been made to increase the power of the light itself, by the introduction of gas and the electric light, and with marked success as respects both. The electric light, as perfected by Professor Holmes, was established first at the South Foreland in 1847, at Dungeness in 1862, and at Souther Point in 1871. At the South Foreland a small factory and staff of men are necessary to keep the electric apparatus in working order. This is partly explained by the fact that, in case of a breakdown of any part, everything is kept in duplicate. During foggy weather also a double power (both machines) can be used. The power of the flame from ordinary gas will not compare favourably with that from the oil lamp, but within the last few years J. R. Wigham of Dublin has introduced a new form of burner, which he calls the circus burner and has



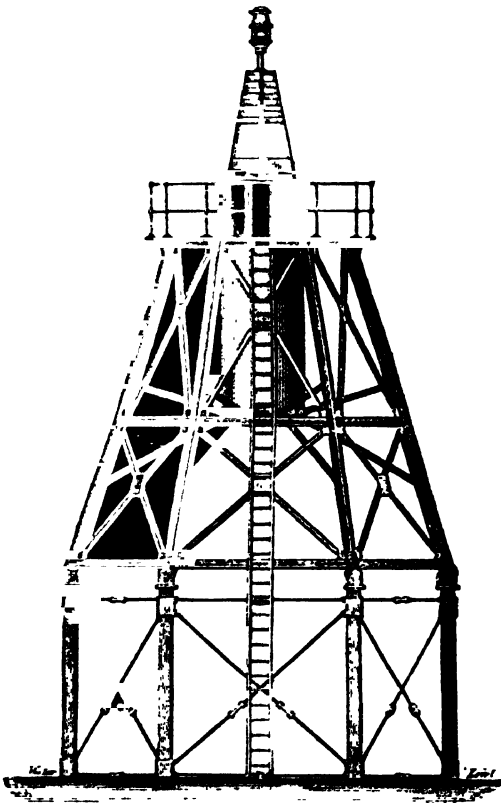
Pintsch's Gas lighted Buoy.

designed an immensely powerful lamp for lighthouse illumination. This lamp has been strongly advocated by Professor Tyndall, and it has been adopted in several of the lighthouses off the Irish coast. Gas, where it can be readily obtained, displays a promptitude of action and a pliancy of adaptation unattainable with oil. In Wigham's lamp a group of twenty-eight vertical tubes, each carrying an ordinary flat-flame burner, are so arranged that the ignited gases issuing from all these jets unite into one large flame. By means of additional groups of twenty jets arranged round the first the light can be increased from that given by twenty-eight jets to one of forty-eight, sixty-eight, eighty-eight, or 108 in the fraction of a minute—a circumstance which makes it peculiarly valuable where fogs are prevalent. Wigham has also successfully designed biform, triform, and quadriform lamps, in which the burners are placed vertically one above the other, with lenses opposite to each. He has also designed a "double quadriform" lamp, in which there will be two columns of burners and lenses side by side. In Plate III. fig. 5, we give an illustration of the burner

invented by Wigham, and his arrangement of lenses for the quadriform burner in fig. 6.

The respective merits of oil, gas, and electricity for lighthouse illumination have during late years been the subject of much controversy, but though very elaborate experiments have recently been made, the question at present remains undecided. The brightest oil or gas flames yet produced are far inferior in brilliancy to the electric light, but the former appear to possess a greater power to penetrate fog, owing to their containing a greater proportion of the red and yellow rays, which, as everyone who has looked at the sun through a fog must have remarked, are the last to yield to this kind of obstruction. The bluish-white light of the electric are being comparatively easily extinguished, it is also at a great distance more easily mistaken for a star in clear weather.

In 1825 the French government undertook a comprehensive scheme for thoroughly lighting their coast, and have since carried it into execution with the greatest possible care, introducing the most recent improvements throughout. They class the lights on their shore in four divisions, according to the power and range of visibility. The first class is visible at 30 miles, the second at 25, the third at 15, and the fourth at 6.



Gas-lighted Beacon at Port Said.

Lighted Buoys and Beacons.—Until recently such marks as buoys, invaluable to vessels in daylight, became quite useless at night or in fog, except in a few cases where the buoy was fitted with a bell sounded by the action of the waves. A great advance was recently made in the introduction of Pintsch's system of lighting buoys by gas. The gas is produced from shale oil, and is of a high illuminating power. It is, after purification, condensed in holders to a pressure of

about 150 lbs. per square inch. In this way it is transported to the buoy, which being a hollow metal vessel becomes itself a gasholder, the condensed gas being admitted until a pressure of about six atmospheres is attained. As the gas, if supplied to the burner at this pressure, could not be consumed to advantage, and would moreover be rapidly exhausted, it is passed through a regulator, that is, an arrangement of self-acting valves so adjusted as to supply the burner with gas at a uniform pressure equal to the weight of a column of water 7 inch in height. The burner is surrounded by a dioptric lens of the "bee-hive" form, as shown in the annexed illustration, and this again is protected by an outer covering of plate-glass. The top or cover of the lamp contains a series of chambers to admit fresh air to the flame and to carry off the products of combustion, but so arranged as to entirely exclude the water should the lantern be covered by a wave. Once lighted the lantern must of course continue to burn day and night until its supply of gas is exhausted; but most of these buoys are constructed to hold a supply which will last for three or four months, or even longer. We give also an engraving of a beacon lighted on this system which has been recently erected at Port Said, on the Suez Canal. The gasholder in this case is the cylindrical vessel shown in the upper part of the beacon, which again is surmounted by the lantern. It is evident that the system can be adapted to many situations where an ordinary lighthouse could not be maintained.

LIGHTNING. The general circumstances attendant on a thunder-storm are familiar to most persons. It will, however, be useful to state some of the most prominent, with a view to their explanation when regarded as electrical phenomena.

At first we see light clouds forming with jagged edges, the relative motions of which are frequently opposite and variable. The atmosphere at the surface of the earth enjoys a stillness and calm, accompanied with some elevation of temperature, as well as considerable barometric and hygrometric changes, which produce on the human system the sensations of closeness, faintness, and oppression, and appear even to the brute creation indicative of some awful and impending changes. Some of these light clouds appear stationary, as if the forces which produced contrary motions in the others made an equilibrium in them. A sound of distant thunder is heard, after which the lower region of the atmosphere is refreshed with light breezes. The calm returns, but the thunder-clouds approach nearer, and flashes of lightning are perceived at short intervals. The course of these is zigzag, owing to the different states of conductivity existing in the air through which it passes offering an easier path in one direction than in another, though some photographs recently taken of lightning flashes show that they often assume a branching form, not unlike an inverted tree. This is the kind of lightning called *forked lightning*, and is justly regarded as dangerous. Great diversity of opinion exists as to whether lightning always strikes downwards. The fact is that the velocity of lightning is so great that the eye cannot detect its direction. Sir C. Wheatstone measured the velocity and found it to be 290,000 miles a second, about half as quick again as light. (Light travels at about the rate of 186,000 miles a second.) The spectator usually looks at the cloud, therefore the flash seems to travel downwards, because the portion of the flash which reaches the eye directly from the cloud is seen before the rest of the flash, which is viewed obliquely. The opposite effect is obtained by looking at the earth. The flash is so rapid that the wheels of a fast train seem to stand still, all the spokes appearing distinct in the lightning flash. In a few seconds after the discharge of lightning heavy showers of rain or hail descend, and the atmosphere is again cooled. The blackness now becomes universal, and the thunder is heard in a loud and sudden clap almost at the same instant that the lightning is seen

when the discharge is overhead. When the discharge is more distant thunder follows lightning at an interval of about five seconds to a mile. Thunder is not audible for more than 15 miles. The colour of the lightning is a variable yellow, depending much on the density and composition of the strata of air through which the discharge takes place. The identity of lightning with the discharge of an ordinary electrical machine is now well known. [See **ELECTRICITY, ATMOSPHERIC.**] Both can dissolve metals, inflame combustibles, reverse the poles of a magnet, and destroy animal life. Professor Richman of St. Petersburg, in 1753, having attached a species of electrometer to his apparatus for measuring the electric intensity of a thunder-cloud, immediately after a loud clap proceeded to read off the indication of his instrument, when a globe of electric fire was discharged through his body; he fell instantly quite dead, and decomposition ensued within forty-eight hours.

When the electric discharge is distant, and is seen by reflection, the appearance then is that of a sudden and wide illumination, as in summer or sheet lightning. This lightning is of course harmless.

A third kind of lightning is the globular, which appears like a luminous ball or globe of fire; it moves through the air at a comparatively slow rate, while forked and sheet lightning exist but for a moment. Lightning of this kind sometimes obtains the name of fireballs; it rolls along the surface with a hissing noise, and often terminates in a disruptive discharge.

The changes of temperature, the electricity of the earth in contact with the air, and that produced by the chemical changes of the various matters of the globe, are the great causes of atmospheric electricity; thus earthquakes, volcanic eruptions, &c., are generally accompanied by violent thunderstorms.

True lightning (forked lightning) is not dreaded without cause. Men and animals are killed if struck by it, buildings are fired, houses, trees, and rocks are rent asunder. In the case of trees the disruption is sometimes attributed to the sudden volatilization of the sap and expansion of air in the vessels; and in the case of rocks, &c., to the effect of induction, which takes place instantaneously and with such energy that the particles of these imperfect conductors are unable to accommodate themselves to the new distribution of electricity with sufficient rapidity.

There is another action of lightning which has only lately been properly understood and explained; and that is the return shock, by which persons are sometimes killed without the passage of an actual flash through their bodies. If a cloud be positively electrified to a high potential, the air beneath it, being a dielectric, will of course become polarized, therefore a large quantity of negative electricity will accumulate on the earth immediately below the cloud; and this heavy inductive charge is shared by all objects, men included, moving or resting upon the earth. When the lightning discharge takes place the inductive charge is also rapidly dissipated; but if it be very heavy it may kill, in its rush for freedom, a living being who is unfortunate enough to be its temporary storehouse.

LIGHTNING CONDUCTOR is the name commonly given to a rod of metal which is attached to buildings or ships, to protect them from the destructive effects of lightning. Its use was first suggested by Dr. Franklin after he had proved the identity of the lightning flash with the electric spark, by his celebrated experiment with a kite.

Thunderstorms may be said to be gigantic repetitions of drawing-room electrical experiments. There must be two masses in opposite electrical states, separated by a non-conductor. Two thunder-clouds, or the earth and a thunder-cloud, separated by the air, give these conditions. When the intensity of the charges becomes too great for the intervening non-conductor to prevent their neutralization by combination, or when its thickness, and therefore

its resistance, is sufficiently reduced by the charged bodies approaching each other, there occurs the discharge and its effects. The discharge invariably follows the line of least resistance at hand, whether that line be made up of metals, bricks and mortar, trees, or animal flesh. Whatever offers the least resistance will be the chosen path; and the chief function of a lightning conductor is to furnish this path. But it has another and very important function. It dissipates the conditions which determine discharge—in fact, prevents lightning; for when a thunder-cloud passes over a lightning conductor its charge is silently, quietly, and continuously neutralized. If a galvanometer were connected with the conductor at such a time it would give indications of the presence of an electric current. Telegraph wires are invariably occupied with currents on such occasions. The presence of a storm at Newfoundland has been observed at the end of the Atlantic cable in Ireland. Hence the conditions that determine a perfect conductor are—(1) that it shall expose in some prominent portion of the building a point, or series of points, sufficient to insure that no great development of electric density shall take place elsewhere; (2) that the connecting rod shall be properly connected with the earth; (3) that the connecting rod shall be strong enough to convey a powerful electric discharge. With respect to the first condition, it has been proved by experience that the circle within which a lightning conductor is efficacious is very limited. According to some calculations its radius is twice the height of the rod, but a more prudent estimate is that the protected region extends throughout a vertical cone whose vertex is at the point, and whose semi-vertical angle is about 45 degrees. Hence for a large building several rods are required, but all may be connected so as to form one general system. The second condition, which requires that the rod shall be properly connected with the soil on land, or with the water at sea, is of vital importance, for where this is not secured the conductor becomes a source of danger instead of safety. A very good plan is to connect it with the iron gas or water mains—the latter for preference; and another is to carry the lower end into a well through a drain filled with charcoal. Sometimes the lower ends of the rods are attached to plates or tubes of metal buried in the ground so as to be permanently damp, and this forms a very excellent arrangement. With respect to the size of the conductor necessary for efficiency different opinions prevail, but it may be safely assumed that an iron rod or rope 1 inch in diameter, or a copper rod not less than $\frac{3}{8}$ ths of an inch, will be amply sufficient. Many of the rods used, though smaller than this, appear to be fully effective in practice. The point of the rod should be protected from oxidation, and the conductor should be solid and continuous to the ground, all joints being carefully soldered.

The conductor need not be carried externally to their disfigurement in the cases of church spires, columns, and chimneys. It is, however, better to carry the wire externally in the case of dwelling-houses, lest it pass too near the lead gas pipes, which, being good conductors and soft metal, might be fused. The stack-pipes down the sides of a house are convenient conduits for the wire, and there is no reason why, if properly insulated, it should not be carried down to the ground inside them, so as to be out of sight. If there be no convenient stack-pipe the wire can be run up and stapled to the brickwork or stone.

Most modern houses of good construction are unintentionally provided with efficient conductors; the eaves and ridges are covered with lead, and these communicate by metal spouts with each other and with the ground, and commonly also by cisterns and water pipes with the iron mains of the town. Such houses are never injured by lightning. For large or lofty buildings, and in all cases where expense is not an important consideration, and where great security and permanency are desired, it is better to

resort to skilled advice and copper conductors. One of the most extensive and elaborate systems of conductors ever erected is that at the Houses of Parliament, on a plan furnished by Sir W. Snow Harris.

Limid or nervous persons often desire to know the safest position they can occupy during a storm. A person reclining on a sofa or bed at a distance from all the walls of the room, could scarcely suffer injury even in a house struck by lightning; but a most absolute security is obtained by lying on an iron or brass bedstead of the form known as the Arabian bedstead, in which the head is surmounted by an iron erection supporting the curtains. A person lying or sleeping within such a bedstead could not possibly receive any direct injury from lightning even if the house were to be demolished, as this bedstead forms the most complete lightning protector which could well be devised. A wooden bedstead placed against the wall affords no special security.

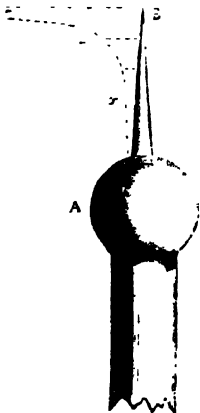
A ship at sea, like an edifice on land, may, when there is an accumulation of electric matter in the upper part of the atmosphere, be struck aloft; or, when the atmosphere is in a contrary state, the lower part of the ship may be struck, the lightning in the latter case ascending along the mast: ships unfurnished with metallic conductors have frequently suffered serious injury during thunderstorms, while those which have been so provided have generally escaped.

The first conductor for ships was in the form of chains, consisting of long links of copper rods, about a quarter of an inch in diameter, united by small eyes, turned in each extremity: the chain was tied to a rope, and so attached to the mast-head, whence it proceeded over the side of the ship into the sea. Each conductor was packed in a box, to be taken out and used as occasion required. As might be expected, storms frequently overtook and damaged ships before the conductor could be unpacked; and sometimes the man sent up to fix it to the mast was knocked down by the lightning in the act of fastening it. In the year 1821 Mr. (afterwards Sir) W. Snow Harris submitted to the lords of the admiralty a plan for protecting ships from lightning. It consisted in the application of capacious conductors so permanently fixed as to render them an integral part of the vessel, and independent of the crew under all circumstances. According to this plan, the masts are converted into lightning-conductors by incorporating with

them a double set of copper plates, so as to produce an elastic metallic line along their surface, capable of resisting any strain which the spars themselves could support. These plates are connected with bands of copper, which lead through the side, under the deck beams; also with the large bolts running through the keels and keelson; and include by other connections all the principal metallic masses employed in the construction of the hull. This plan was ultimately adopted, and is now used, not only throughout her Majesty's fleet, but by the mercantile navy to a large extent.

It is often said that the lightning conductor collects electricity, but this is a very loose way of speaking. The action of a pointed conductor is best shown by a consideration of the conductor of an ordinary electrical machine.

When this ends in a rounded knob, as at A, the density of the electricity is tolerably even all over it, but if a point be now added the density rapidly increases from x to y , till it becomes infinite at the apex B, as in the figure annexed.



Density of Electricity
at a Point.

Suppose the clouds to be charged dangerously with positive electricity, then a powerful charge of negative electricity will be piled up by induction at the point B of a lightning conductor, while the induced positive charge is driven off down the conductor on account of the repellent power of like electrical states, and is neutralized by the moist earth in which the conductor ends. Meanwhile there is no doubt that a powerful "electric wind" rages from the lightning conductor, just as it does from a pointed conductor applied to an electrical machine. Most people know how from a point on a charged conductor a candle flame is blown strongly aside, and the hand feels a cool stream; or a light cross of brass fixed above the conductor on a pivot, its arms ending in points, will rotate by the repulsion of the electric wind. This wind is due to the strong mutual repulsion between the electrified air particles near the point, charged by the heavy charge of electricity (amounting to infinity) accumulated on the point, bodies charged with like electricities tending to fly from one another. Also this charge being negative (in the assumed case as to the lightning conductor) will neutralize a corresponding amount of the positive electricity of the thunder cloud.

LIGHTS, ANCIENT. An ancient light is a right to the enjoyment of free access of light to a man's premises or buildings, which right must not be impaired by the building or erection of any object in such way as to obstruct the light. By the 2 & 3 Will. IV. c. 71, s. 8, an absolute right to light may now be acquired by twenty years' uninterrupted enjoyment, unless the use has been enjoyed by some consent or agreement made or given by deed or writing. This, however, does not extend to Scotland, where a proprietor's right to build on his own ground does not fall by prescription, and a servitude of light can only be secured by special grant.

LIGHTS, NORTHERN. See AURORA BOREALIS.
LIG'NIN. See CELLULOSE.

LIG'NITE (Lat. *lignum*, wood) is a variety of brown coal in which the woody structure is still apparent. It is coal in a very rudimentary condition, being but one remove from peat. Lignites occur chiefly in beds of Tertiary age, and generally have their underclays, and are in other respects analogous to coal seams. Although not of much importance in the British Isles as sources of fuel, on the Continent, in Hungary and Germany, they are extensively used. In the western and north-western plains of America the lignitic formations furnish good fuel for local purposes. The average composition of lignite is about—carbon 67.5, hydrogen 6.5, oxygen and nitrogen 27 per cent. The heating power of lignite is low, and it usually gives a large amount of ash.

LIG'NUM-VITÆ is the wood of *GUAIACUM officinale*, a tree belonging to the order ZYGOPHYLLÉE, native of the tropical parts of America, but chiefly obtained from Jamaica and St. Domingo. This wood is remarkable for its hardness, heaviness, and exceeding toughness. The heart-wood, which is the part used, is of a dark, greenish-brown colour, rarely more than 8 inches in diameter. The tree itself grows 30 or 40 feet high, and has generally a crooked stem and knotty branches. *Lignum-vitæ* is much valued, and used for many purposes, chiefly by turners, and for making ships' blocks, rulers, pestles, bowls, and wheels for pulleys. Shavings, raspings, the bark, and a resin obtained from the stem, are used in medicine.

LIG'ULATE, in botany, a term used to describe the form of the corolla in many plants which belong to the order COMPOSITÆ, and other orders. When a gamopetalous corolla splits and spreads out in the form of a tongue or strap the flower is said to be ligulate.

LIGUORI, ALPHONSO MARIA DE, a saint of the Roman Catholic Church and founder of the order of the Liguorians or Redemptorists, was born at Marianella, near Naples, 27th September, 1696. He came of a noble

family, and had attained some success in the legal profession when he suddenly abandoned it in favour of the monastic life, and being accepted as a novice in 1721 he was ordained a priest in 1726. He soon became popular as a preacher and confessor, and from the fervour of his zeal on behalf of the common people he was called the apostle of the poor and ignorant. In 1732 he founded the order of the Holy Redeemer in the face of much opposition at Villa Scala, and he obtained papal sanction for it in 1749. The work of the missionary priests of this order is directed towards the instruction of the poor and ignorant, by means of ministrations of the plainest and simplest character, and their labours are designed to supplement the work of the regular clergy. In 1762 Liguori was, much against his will, appointed bishop of Saint Agata dei Goti, a small town in the province of Benevento. He performed the duties of his bishopric for thirteen years, displaying conspicuously all the virtues of the pastoral office; but in 1775, being seventy-nine years old, he sought and obtained permission to retire. He then took up his abode at the principal house of the order he had founded, at Nocera dei Pagani, where he died 1st August, 1787, in his ninety-first year. In 1796 he was decreed the rank of Venerable by Pius VI., was beatified by Pius VII. in 1816, canonized by Gregory XVI. in 1839, and finally declared a "Doctor of the Church" by Pius IX. 11th March, 1871.

Liguori was a voluminous writer, and his works, which extend over nearly the whole domain of theology, fill seventy volumes 8vo. His fame chiefly rests, however, on his works of casuistry, which form the text-books recommended by the highest Catholic authorities, and which are more widely used by the Roman Catholic clergy than any others. The chief of these is the work entitled "Moral Theology," which was first issued in 1753, and has been constantly reprinted ever since. This book has given rise to much controversy, and it has been opposed by Roman Catholics as well as by Protestants, but by the great majority of the former it is held in high honour. In this work Liguori advocates a modification of the doctrine of probabilism, and according to his own account endeavors to steer a middle course between the extremes of rigour and laxity. The best edition of his works is that of Monza, seventy volumes 8vo. The "Life of St. Alphonsus de Liguori" was published in London in 1848.

LILAC (*Syringa*) is a genus of plants belonging to the order OLEACEÆ, and therefore a close relation of the olive. The Common Lilac (*Syringa vulgaris*) is a native of South-east Europe, and was introduced in 1597. It is now a common ornament of our shrubberies, blossoming together with the laburnum, in May. It is one of the few shrubs that resist the injurious influence of the smoke of cities, and flourishes in great perfection in some of the squares of London. *Syringa Josika* (Josika's Lilac), is a native of Transylvania, and was discovered by the Baroness von Josika, after whom it was named by Jacquin. It attains the height of 6 or 8 feet, and has broad leaves. It grows in damp shady places near water. Though very dissimilar in appearance to the common lilac, it has been suspected to be only a variety of that species. It is not yet very common in our nurseries. *Syringa Persica* (the Persian Lilac), with small narrow pointed leaves and purple flowers, is one of the most ornamental of our low shrubs. Of this species three varieties are found in the nurseries, the white, the cut-leaved, and the sage-leaved Persian lilacs.

All the lilacs will grow in almost any kind of common soil; the best way of propagating them is by the suckers which they send off in so great abundance. They may be grafted on privet or ash stocks, and in this way the inconvenience of their great produce of suckers may be got rid of.

Syringa is also the name commonly but improperly given

to the Mock Orange (*Philadelphus coronarius*), on account of its stems being used for the manufacture of Turkish pipes. Its stems equally with the lilac had the name of pipe-privet or pipe-tree applied to it when first introduced into this country, and afterwards the name *Syringa*.

LILIA'CEÆ, an important order of MONOCOTYLEDONÆ, containing many of the most beautiful plants of that class of the vegetable kingdom. A large proportion, especially of those of cold countries, consists of bulbous plants, producing annually a stem which perishes after having produced its leaves and flowers; others have an annual duration with perennial fleshy roots; and a few acquire, in warm countries, a stem of very considerable size, as the dragon-tree. There are 2100 species, and they are found in every quarter of the globe. The flowers are generally regular, the perianth consisting of six petaloid lobes. There are six stamens opposite to the lobes. The ovary is free, three-celled, with two or several ovules in each cell. The embryo is generally minute, and is inclosed in abundant albumen.

The Liliacæ are divided by Bentham and Hooker into the following tribes:—

Series A.—Stem without a bulb, often scaly below and leafy above, or a scaly scape; anthers dehiscing inwards; fruit generally baccate.

Tribe I. Smilacææ.—Stem twiggy or climbing; leaves three to five-nerved, not-veined, anthers apparently one-celled. Ovules orthotropous or half anatropous. *Smilax* is a genus of climbing shrubs, with net-veined leaves, flowers in globular buds, and fruit a berry. Some of the species supply the drug known as sarsaparilla.

Tribe II. Asparagææ.—Stem branched or climbing; branches simulating leaves and sometimes needle-shaped. Ovules orthotropous or half anatropous. The genus *Asparagus* belongs to this tribe. One of its species attains the well known vegetable, *Ruscus*, or butcher's broom, is especially interesting to us, as it is the only woody monocotyledonous plant which is native to the British Isles.

Tribe III. Luzuriagææ.—Stem shrubby or climbing; anthers with distinct cells. Ovules anatropous. *Luzuriaria rosea* is a favourite in our green houses. It is a native of Chili, a twining undershrub, with somewhat bell-shaped rose-coloured perianth.

Tribe IV. Polygonatææ.—Stem herbaceous, simple or slightly branched, leafy above. Ovules anatropous. *Polygonatum*, the type of the tribe, is commonly called Solomon's Seal. One species, *Polygonatum verticillatum*, grows abundantly in a few places in Great Britain; another, *Polygonatum verticillatum* is native, but is found only in two localities, Perthshire and Northumberland; a third species, *Polygonatum officinale*, is sometimes found in woods in England.

Tribe V. Concellariææ.—Leaves fasciated on the rhizome, often inclosed at the base with the leafless lateral scape by sheathing scales. Flowers in a simple raceme or interrupted spike. Ovules anatropous. *Concellaria majalis* (lily of the valley) is a good example of this tribe.

Tribe VI. Aspidistriææ.—Leaves on the rhizome few, large, petiolate, or contracted at the base. Scape among the leaves, simple, very short, and one-flowered, or terminated by a dense spike. Stigma very large and peltate. *Aspidistria* is a genus found in China and Japan. The flowers are bell-shaped and of a dull purplish colour.

Series B.—Leaves on the rhizome, either thickly crowded at the top of the caudex, or forming a bulb at the base of the scape, on the stem, either smaller than the radical or altogether wanting. Anthers dehiscing in-torsely. Fruit loculicidally dehiscing, more rarely indehiscent or baccate.

Tribe VII. Hemerocallææ.—Leaves crowded on the short rhizome, linear or membranaceous. Scape high. Perianth tubular, funnel-shaped, or campanulate. The

filament is attached to the anther in a dorsal pit. Fruit capsular. Hemerocallis (the day lily) is easily recognized by its large yellow or orange-coloured tubular perianth. Funkia is another genus of this tribe, found in our gardens; it has racemes of blue or white flowers; the seeds are winged at the apex. Kniphofia is found at the Cape of Good Hope. The species are well adapted for shrubberies. They are hardy plants with handsome yellow or scarlet flowers, borne in a spike at the top of the lofty scape. This genus is often known by the name Tritoma. Phormium is confined to New Zealand and Norfolk Island; a strong fibre, New Zealand flax, is obtained from these plants.

Tribe VIII. Aloineæ.—Leaves, on the rhizome or crowded at the apex of a woody caudex, fleshy, thick or rigid, at the margin often spiny or membranaceous. Flowers in the upper axils. Segments of the perianth connate into a tube. Anthers dorsifixed with the filament inserted in a pit. Ovules numerous in the cells. Fruit dry, more rarely fleshy, dehiscent loculicidally. The genus Aloe is the type of this tribe. The species are well known in tropical countries, and wherever they abound they give a peculiar aspect to the landscape. The drug is prepared from several species. The American Aloe is quite a different plant, belonging to the genus Agave, which is one of the order Amaryllidæ.

Tribe IX. Draceneæ.—Leaves on the rhizome or at the apex of a woody caudex, numerous, crowded. Scape or peduncle erect, leafless, except for the foliaceous bracts. Perianth tubular, campanulate, or funnel-shaped. Anthers without pits. Dracena is the famous dragon tree. Yucca is another genus. The species are natives of the southern part of North America, and are frequently cultivated in this country. Yucca gloriosa is the species most commonly grown. Cordyline also belongs to this tribe.

Tribe X. Asphodelæ.—Rhizome short, rarely bulbous. Flowers in a raceme. Leaves not thick. Segments of perianth generally distinct. Capsule loculicidal. Asphodelus (the asphodel) is the type of this tribe. Asphodelus albus is a common garden plant.

Tribe XI. Johnnieæ.—Rhizome short or creeping, not bulbous. Flowers in heads or umbels, surrounded by bracts. The genus Johnniea is found in Australia. The flowers are small.

Tribe XII. Allieæ.—Bulb or corm leaf-coated. Umbel on a scape, enclosed at first by a membranous bract. Capsule dehiscent loculicidally. The genus Allium includes the onion, leek, chive, shallot, and garlic. The genus Agapanthus is found in South Africa; the species have large clusters of blue flowers, and are cultivated as ornamental plants.

Tribe XIII. Scilleæ.—Bulb coated. Raceme (rarely a spike) simple, terminal on a leafless scape. The Hyacinth (Hyacinthus), Squill (Urginea maritima), and Blue-bell (Scilla nutans) all belong to this tribe. Other genera are Eucharisia, Muscari, and Ornithogalum.

Tribe XIV. Tulipeæ.—Bulb coated or scaly. Stem with one or several leaves. Flowers few, often large, in a raceme. This is the typical tribe of the order, as it contains the true lilies (Lilium); the tulip (Tulipa) and fritillary (Fritillaria) also belong to the tribe. Calochortus is found in Mexico, California, and North-west America. The species have very beautiful flowers, but are rather objects of cultivation. Gagea lutea is a rare native plant of Great Britain.

SERIES C.—Bulb coated, or stem herbaceous without a bulb, more rarely climbing, leafy, at the base or upwards. Anthers dehiscing outwardly. Capsule generally septicidal, sometimes loculicidal, or fruit a berry. Embryo small, often minute.

Tribe XV. Colchicæ.—Corm coated. Scape very short within underground sheaths. One to three flowered.

Perianth tube long. Anthers dehiscing inwardly. Capsule septicidal. Colchicum (or meadow saffron) is often called the autumn crocus, but the true crocus belongs to a different order—the Iridaceæ. The corms and seeds of Colchicum autumnale are collected for medicinal purposes. Bulbocodium is an allied genus.

Tribe XVI. Anguillaræ.—Bulb coated. Leaves on the stem few, narrow, continuous at the base with the sheath. Anthers dehiscing outwardly. Capsule septicidal or loculicidal. The genera Anguillaria and Ornithoglossum are not important.

Tribe XVII. Narthecieæ.—Stem without a bulb. Radical leaves crowded or stalked, those on the stem small or wanting. Anthers generally dehiscing outwardly. Capsule septicidal or loculicidal. Narthecium is the type of this tribe; it is well known in this country from the native species, Narthecium ossifragum; it is found in marshy places, and was at one time suspected of being the cause of the rot in sheep.

Tribe XVIII. Uvulariæ.—Stem without a bulb, leafy, herbaceous, or climbing. Leaves alternate, sessile or amplexicaul, sheaths wanting. Anthers dehiscing outwardly. Capsule loculicidal or septicidal, rarely a berry. The species of Uvularia are natives chiefly of the United States, where the bruised leaves of one species is used as a remedy for the bite of the rattlesnake. Gloriosa is found in India and Africa. The species Gloriosa superba is a favourite with cultivators all over the world.

Tribe XIX. Medeolæ.—Stem without a bulb, leafy. Leaves few, subradical, or verticillate on the stem. Flowers terminal, solitary, or umbellate. Anthers dehiscing outwardly. Fruit, a berry. Medeola virginica, the type of this tribe, is called in North America the Indian cucumber, from the taste of its white underground stem. Paris quadrifolia is found native in our own woods; it was formerly used in medicine. Trillium is a North American genus; the three outer leaves of the perianth are calyx-like, the three inner are petaloid, but soon fall.

Tribe XX. Veratraceæ.—Stem high, with or without a bulb, leafy, or, except the radical leaves, almost leafless. Veratrum is a genus found in mountainous parts of Europe and North America. The underground stems of Veratrum album are collected in the Pyrenees and the Alps for use medicinally.

LILLE, a town of France, the capital formerly of French Flanders, now of the department of Nord, is situated at a distance by railway of 155 miles N.N.E. of Paris, 67 miles S.W. from Calais, and had in 1881 a population of 171,432. It stands in a fertile and level country at the junction of the Haute-Deule and the Basse-Deule, as the two cuts of the canal that unites the Scarpe and the Lys are called. These two cuts are united by a third, called Moyenne-Deule, which, passing west of the town, conveys barges too heavily laden or too large to pass through any of the numerous channels that traverse the city for purposes of commerce, or to drive the machinery of the numerous factories. The town is well built; the streets are regular, wide, and provided with foot-pavements; the houses are in general three or four storeys high, and built of brick or limestone. It contains thirty-four squares and market-places, thirty bridges of all sizes, about 200 wide streets, and many factories and mills, which, together with a far greater number in the environs, announce to the traveller by their lofty chimneys that he is approaching one of the great hubs of industrial activity. Lille, which is entered by eleven gates, a railway entry, and two water-gates, is surrounded by very strong fortifications and wet ditches, and defended by a citadel, said to be the masterpiece of Vauban. The citadel is a regular pentagon of 426 yards' diameter; it is situated south-west of the town, and separated from it by a wide esplanade, which, crossed by the Moyenne-Deule, and planted next the town with

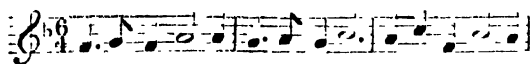
several avenues of trees, forms a fine promenade, close to which is the handsome Pont Royal. There are also barracks and magazines on the north-western side of the town.

The most remarkable public structures of Lille are the Church of St. Maurice, begun in 1022 and restored in 1874, St. André, and Notre Dame de la Treille; the Palais de Justice; the town-house, on the site of a palace; the prefecture; the town-hall, built by John the Bold in 1430, and for a long time the residence of the dukes of Burgundy; the hospitals; the large corn-stores at the end of the Rue Royale; the theatre; the concert-room, one of the finest in France; and the bridge across the Moyenne-Deule. The Paris gate is a handsome Doric triumphal arch, built in 1682 to commemorate the military exploits of Louis XIV. There are also a bourse, medical school, several other Roman Catholic and Protestant churches, Jew's synagogue, prisons, mint, &c., an academy of music and architecture, and a botanic garden. The Hotel de Ville contains the museum, which has a valuable picture gallery, said to be the most important in France after that of the Louvre. It contains a collection of drawings by Raffaele and others.

Flax spinning is the chief industry of Lille, and flax is extensively cultivated in the vicinity. The manufactures consist of all kinds of cotton goods; linen and linen thread, lace, tulle, blankets and other woollen stuffs; velvets, paper, leather; steam machinery and ironmongery; gin, beer, glass, soap, tape, hats, carpets, chemical products, mineral acids, &c. There are also government establishments for the manufacture of tobacco and gunpowder. The vicinity is studded with bleaching grounds, rape-seed oil mills, and beet-root plantations, the last-named being very extensive. Railways and canals connect the town with all parts of France and Belgium. Lille is the seat of tribunals of first instance and of commerce; it has several banks, a council of prud'hommes, a college, a school of painting, various establishments for the gratuitous instruction of working manufacturers, and a large number of charitable institutions.

Lille belonged to the counts of Flanders, kings of France, and dukes of Burgundy, and was finally annexed to the crown of France by Louis XIV., in 1667. It was taken by siege by the allies, under the Duke of Marlborough, in 1708, and unsuccessfully bombarded by the Austrians in 1792.

LILLIBURLE RO, a favourite tune of Henry Purcell's, which was set to a ballad written by Thomas Watson, M.P. for Bucks, in the time of James II.'s greatest unpopularity, and levelled against the Roman Catholics. The burden of the ballad, *Lilliburlero*, was a mock Irish word, and the whole thing was meant to ridicule the king's appointment of the bigoted sycophant General Talbot, whom he made Earl of Tyrconnel, to the lord-lieutenancy of Ireland. Wedded to Purcell's tune, already a favourite quick march in the army, the doggerel, with its barbarous mock Irish jargon, flew over the three kingdoms; and utterly futile as it was, it served as a party weapon, and powerfully contributed to drive James from the throne. As Bishop Burnet says, "Perhaps never so slight a thing had so great an effect." It will be remembered how Sterne depicts in "Tristram Shandy" a veteran of the Boyne as always whistling "Lilliburlero." Watson afterwards boasted that he had sung a king out of three kingdoms; but in truth the success of his verses was the effect, not the cause, of the excited state of the public feeling. It served as a vent for emotions which were only waiting to blaze forth. The following is the first stanza.



1. Ho! Broder Teague, dost thou de de cree, Lil-li bur-le-ro.
2. Dat we shall have a new de-pu-tie, Lil-li bur-le-ro.



LILLY, WILLIAM, a celebrated English astrologer, was born 1st May, 1602, at Diseworth, in Leicestershire. He removed to London in 1620, where he became servant to a mantua-maker. In 1627 his master died, whereupon Lilly married the widow, with whom he received the sum of £1000. In 1632 he began the study of astrology under one Evans, a clergyman who had been expelled from his curacy for fraud, and soon acquired such a fame for casting nativities and foretelling events that he was applied to, in 1631, to ascertain, "by the use of the Mo-saical or miners' rods," whether there was not extensive treasure buried beneath the cloisters of Westminster Abbey. Permission having been obtained from the dean, on condition that he should have his share of whatever might be found, "Lilly and thirty other gentlemen entered the cloisters one night, and applied the hazel rods;" but after they had disinterred a few leaden coffins, a violent storm arose, which so alarmed them that they all took to flight, and ran home. In 1644 he published his first almanac, by the title of "Merlinus Anglicus, Junior;" and such was the avidity with which the people received his prognostications, that the whole edition was sold in a few days. He continued the issue of this until his death. During the contest between Charles I. and the Parliament he was at first a royalist; but after the year 1645 he engaged heartily in the cause of the Parliament, and was one of the close committee to consult upon the king's execution. Having amassed a fortune by the practice of astrology, he purchased an estate at Hersham, to which he retired previous to the Restoration, and where he died, 9th June, 1681. The character of Lilly has been faithfully drawn by Butler under the name of Siodrophel, although some authors have supposed that character to have been intended for Sir Paul Neal.

LILY (*Lilium*), a genus of plants, the type of the order LILIACEÆ. *Lilium candidum* (common white lily) blossoms early in the summer, and has been cultivated in our gardens from time immemorial. The roots are the only parts of the plant available in medicine, and they are frequently employed as emollient poultices, owing to the mucilaginous matter which they contain. It is, however, doubtful whether they are more efficacious than poultices formed of bread or farina. This species, as well as others, is cultivated in Siberia, and eaten like the potato. The scent of the lily is exceedingly powerful, and peculiarly distressing in some cases. Murray mentions an instance of death ensuing from exposure to the odour of this plant. *Lilium Martagon* (Turk's-cap lily), though not a native of Great Britain, is naturalized in copes in many places.

All the species and varieties of *Lilium* are valuable as plants of ornament for the beauty of their flowers, which have a noble appearance. They are proper for the pleasure-ground, and if planted with judgment, succeed each other in blooming upwards of three months. The common white lily, the orange lily, and Martagon will thrive under trees. The orange lily also answers well for small gardens and confined situations in towns and cities.

LIMA, the capital of the republic of Peru in South America, is situated about 6 miles from its port, Callao, which is on the shores of the Pacific, and with which it is connected by a railway. Lima is built in a spacious and

fertile valley, traversed by a small river, called the Rimac. The river washes the northern walls of Lima, and over it there is a handsome stone bridge leading to the suburbs of St. Lazaro and to the Alameda or public walk. Elsewhere the city is inclosed by a bastioned wall, entered by six gates. It is about 2 miles in length, and $1\frac{1}{2}$ in its greatest breadth. The houses are low and have rarely more than one floor; they are lightly built, on account of the frequent earthquakes, which have repeatedly reduced the city to ruins. The streets are regular and wide, but the pavement is bad. The city occupies a nearly triangular space, the base extending along the banks of the river. A fine street leads from the bridge to the Plaza Mayor, or great square, in the midst of which is a large fountain. On the north side of the square is the government palace, a large but gloomy-looking edifice; on the east side are the cathedral and the archiepiscopal palace, now partly occupied by the Peruvian senate—the former is a handsome building of considerable extent; on the west side is the town-hall and the city prison; the south side is occupied by private houses. The other principal edifices are the churches, eleven public hospitals, a university, the most ancient in America, having been founded in 1576; a national and a public museum, a public library with rare books; ecclesiastical, naval, and other schools; a theatre and a bull ring; and outside of the walls are a public cemetery and baths.

Lima is of Spanish origin, and is the most handsome city in South America, its numerous domes and spires giving it a magnificent appearance. Its vicinity is fertile, and large quantities of provisions and live stock are produced. The climate is pleasant and reputed to be healthy, the elevation being 153 feet above the sea; but the mortality is high, partly owing perhaps to great neglect of drainage and disposal of refuse. There are abundant dews, but no rain. The mean temperature of the year is $73^{\circ}3'$; in winter, $68^{\circ}1'$, and in summer, $77^{\circ}0'$ Fahr.

This city was for a long period the grand commercial depot for all the western coast of South America, and it still has a large trade, its exports consisting of silver, copper ore, bark, soap, vicuña wool, chinchilla skins, nitre, sugar, &c.; and the imports of manufactured goods, wines, silks, and brandy.

The population is 160,000, consisting of free mulattoes, slaves, Indians, mestizos, and a few Europeans. The manufactures are neither numerous nor extensive; the principal manufactured articles are utensils and vessels of silver, gilded leather, cotton cloth, gold lace, and capulettes. A glass factory has also been established. Among the Creole inhabitants are many rich families, who owe their fortunes to the mines, and are now large landed proprietors.

Lima was founded in 1535 by Pizarro, the discoverer and conqueror of Peru, who intended it to be the permanent seat of government of the conquering nation. The present name is a Spanish form of the word *Rimac*, the river on which the town stands. It was first called *Ciudad de los Reyes* (City of Kings). Here Pizarro lived until 1541, when he fell by the hands of assassins. It suffered severely from the earthquakes of 1678 and 1746, the latter leaving only twenty houses standing out of 3000; and again by those of 1764, 1822, and 1828. San Martin entered it on the 12th July, 1821, and proclaimed the independence of Peru at Lima on the 28th of the same month. It suffered severely during the war between Chili and Peru in 1880, and was occupied by the Chilean army in 1881.

LIMACIDE. See **SILIC.**

LIME, in astronomy, the edge of a planet; also the edge of any circle which forms part of an astronomical instrument.

LIMBER, in artillery, a two-wheeled carriage for carrying the ammunition in field practice. It forms one-half of the field-equipage, the mounted cannon forming

the other. To unlimber is to unhook from the gun the part of the equipage which has the ammunition box, and thus to leave it free to be served; to limber up, on the other hand, is to join both together again.

LIMBURG, a province of Belgium, bounded north by North Brabant, east by the duchy of Limburg, from which it is separated by the Maas, south by Liège, and west by Antwerp and South Brabant. The area is 934 square miles, and the population in 1880 was 210,851. The surface is flat, except in the south, where there are a few hills. The east of the province, along the left bank of the Maas, is fertile in corn, hemp, flax, tobacco, madder, fruits, &c. The district also between the Jaar and the Demer possesses a fertile soil. The rest of the province consists of a sandy soil, presenting towards the north extensive barren heaths and many marshes. The pasture-lands are extensive, and cattle-feeding is more attended to than tillage; there is a good breed of horses, and bees are carefully tended. The principal rivers are the Maas, which receives the Jaar on its left bank at Maastricht; the Demer, which, rising west of Maastricht, runs westward past Hasselt, and having received several small feeders from both banks, enters South Brabant on its way to join the Dyle, a feeder of the Scheldt; and the Dommel, which rises in the north of this province, and flows through North Brabant, where it enters the Maas at Crèvecoeur. Iron, calamine, coal, and turf are the chief products of the province. Hasselt is the capital.

LIMBURG, a Dutch province with the title of duchy, bounded on the east by Rhenish Prussia, on the other sides by the provinces of North Brabant, Liège, and Belgian Limburg. The area is 851 square miles, and the population in 1880 was 210,000. It extends 71 miles from north to south, with an average breadth of 14 miles, but at some points the width does not exceed 3 miles. In the southern part, extending along the right bank of the Maas, the soil is fertile, but in the north bogs, moors, and marshes cover a great part of the surface. Cattle-breeding and agriculture are the chief occupations of the inhabitants; the products are similar to those of the Belgian province of LIMBURG. The principal rivers besides the Maas are its feeders from the left, the Roer and the Neisse. Maastricht is the capital.

LIME. See **CALCIUM.**

LIME LIGHT, or **DRUMMOND'S LIGHT.** The difficulty of distinguishing the stations chosen for the angular points of the triangles in a geodetical survey, when these stations are many miles asunder, renders it necessary to have recourse to powerful illuminations, and the late Captain Drummond of the Royal Engineers invented, for the day, a heliostat which reflected the sun's rays in sufficient abundance to render the station which was to be observed visible; and for the night a light produced by placing a ball or disc of lime, about a quarter of an inch in diameter, in the focus of a parabolic mirror at the station to be rendered visible, and directing upon it, through a flame arising from alcohol, a stream of oxygen gas. The intensity of the flame was from sixty to ninety times as great as that of an argand burner, while the expense was only about ten times as great. The lime made from chalk is preferred to any other, and such was the brilliancy that stations above 60 miles from one another have been very distinctly visible even in hazy weather, and in clear weather the light has been seen at a distance of over 100 miles. In great trigonometrical surveys, such as that of India, where distant stations have to be frequented, the portability of the Drummond light over the electric causes the former to be still preferred. Hydrogen was soon substituted for alcohol as a source of the flame whose heat the oxygen stream was so enormously to intensify that the lime might be raised to a white heat. The name "Drummond" now gave way to "Oxyhydrogen lime light."

The employment of coal-gas instead of hydrogen has greatly increased the application of the lime light, and it is now used in apparatuses where great brilliancy and penetration of light are required, such as magic lanterns, photography, &c. As many dangerous explosions, however, have occurred owing to its use, too much caution cannot be observed in the preparation, storing, and em-

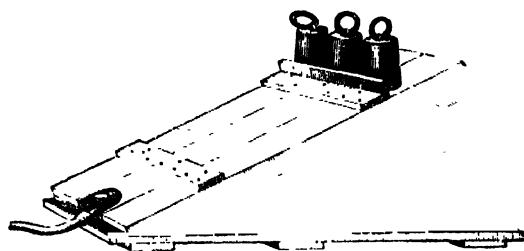


Fig. 1.—Oxygen Bag.

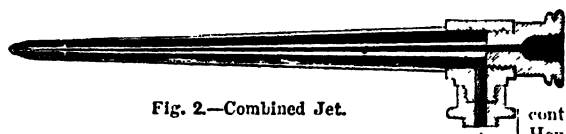


Fig. 2.—Combined Jet.

ployment of the gases. The lime light does not vitiate the surrounding air. The use of the ordinary apparatus is shown above. The oxygen is in the flexible bag fig. 1, the weights driving it through the outlet tube by pressure. Fig 2 shows the form of combined jet often used, the hydrogen (or coal-gas) entering at *A* and the oxygen at *B*.

LIMERICK, an inland county of the province of Munster, in Ireland, bounded north by the estuary of the Shannon, west by Kerry, south by Cork, and east by Tipperary. The greatest length east to west is 54 miles; the greatest breadth north to south is 35 miles. The area is 1036 square miles or 662,973 acres. The population in 1881 was 142,070; in 1841 the number was 331,003.

The general surface of Limerick is an undulating plain, sloping towards the Shannon on the north, and surrounded on its southern and western borders by a margin of mountain groups and hilly uplands. A mountainous tract occurs also in the north-eastern extremity of the county. The north-east mountains are the Slieve Phelim and the Bilboa groups. The country between the western declivities of the Slieve Phelim hills and the Shannon is mostly flat and boggy. The principal rivers of the county are the Shannon, the Maigue, Deel, and Muleair.

Although the Shannon does not lose the character of a river until after passing beyond the bounds of this county, yet for all the purposes of commerce it is equivalent to an equal length of sea-coast from Glin to Limerick, a distance, including the windings of the river, of about 35 miles.

The level part of the county consists of carboniferous limestone. The mountain groups and detached eminences of its eastern and southern margins are formed by the protrusion of older rocks; and the high lands on the west consist of more recent series superimposed. The Slieve Phelim and Bilboa groups, in common with the extensive range of which they form a part, consist of a nucleus of clay-slate supporting flanks of yellow sandstone and conglomerate disposed in conformable beds. Small portions of old red sandstone, crystalline green, flinty limestone, and other rocks, appear at various parts of the surface. Pallas Hill is distinguished by the presence of columnar basalt, which overlies the amorphous trap of its northern brow. The mountainous district on the west of the county belongs to the great Munster coal tract, which is probably the most extensive in the British islands; but the coal is slaty, and the mines difficult to work on account of the

great inclination of the beds. Fine dark-coloured marble, and small quantities of iron, copper, and lead are met with in the county.

A tract of extraordinary fertility, called the "Golden Vale," occupies the greater part of the centre of the county. The soil is a rich, mellow, crumbling loam, and is equally suited to grazing or tillage: it is chiefly in pasture. A still richer soil is that of the "Corcasses," which extend for 15 miles along the southern bank of the Shannon, from a little below Limerick to the embouchure of the Deel. They yield the greatest wheat-crops raised in Ireland; and their produce of potatoes is also large. The soil of the limestone plain is very good for tillage, and yields an excellent pasture for dairy cattle and sheep. Pastoral and dairy farming are the staple occupations of the people. Much bog and mountain land has been reclaimed. Horned cattle, sheep, and pigs of a very superior description are bred. The climate of the county is mild, but humid.

There is a small manufacture of coarse woollens for home consumption, and the bleaching of linen is carried on, but on a contracted scale. There are paper-mills, and large and powerful mills for the grinding of corn.

The county is divided into fourteen baronies and contains 131 parishes. It returns two members to the House of Commons.

History and Antiquities.—Prior to the arrival of the English, Limerick constituted part of the petty kingdom of Thomond or North Munster. Donald O'Brien was prince of this territory at the time of the English invasion; and in order to carry out a feud with a rival chieftain, he was among the first to tender his homage and receive an English garrison into his city, in 1172. But he did not long continue loyal, and after many conflicts a considerable portion of Limerick was given by King John to the Fitzwalters, the Fitzgeralds, and other great families. These new settlers brought in a colony of English, chiefly from Bristol and Chester, who took up their residence in the city and towns near the river. The greater portion of the county was possessed by the powerful family of the FitzGeralds, earls of Desmond, until their final forfeiture by Gerald, the sixteenth earl, in 1586. The estates of this unfortunate nobleman in Limerick alone consisted of 96,165 acres, which were divided among twelve individuals, most of whose names are now extinct in the county. The war which ensued throughout Munster was an obstinate and disastrous one. On the breaking out of the rebellion in 1641, the city of Limerick and all the chief castles of the county, with one or two exceptions, fell an easy prey to the insurgents, in whose hands they for the most part continued until the capture of Limerick by the Parliamentary forces under Ireton, in 1651. The forfeitures which ensued embraced almost the entire county, and introduced a numerous new proprietary. The war of the Revolution terminated in further forfeitures. From this time until the latter end of the last century the county continued undisturbed, but many outbreaks occurred in the earlier part of the present century.

Limerick is among the richest of the Irish counties in antiquities. There are extensive Cyclopean remains on the hill of Knockfennel, near Loch Gur. The fort on the western pinnacle of the hill is a circle of 360 feet in circumference, with a wall 10 feet thick, composed of massive blocks of dry stone, and with other walls of similar construction. Military earthen works are numerous in all parts of the county. At Carrigreen, near Croom, are the remains of a round tower 50 feet in height; and there are indications of two others. The ruins of religious houses are very numerous. Adare, Kilmallock, and Askaton are peculiarly interesting from the number and extent of their ecclesiastical remains. The river Camague

alone has the ruins of seven religious houses on its banks. Manister-Nenagh, the chief of these, is the most extensive pile of monastic ruins in Munster. Of the castles of the early proprietors, nearly one hundred still remain. Of these the most remarkable are Croom Castle, Shanet Castle, Cappa Castle, Castle Connel, and Carrick-agonnell. The last-named, a stronghold of the O'Briens, is boldly situated above the southern bank of the Shannon; it was blown up in the war of the Revolution, but two of the towers are still tolerably perfect. There are several stone circles, and other supposed remains of Druidical worship, throughout the county.

LIMERICK, the capital of the above county, a city and county of a city, a port, and a borough, is situated at the interior extremity of the estuary of the Shannon, 50 miles from the Atlantic Ocean, and 119 miles west-south-west from Dublin. The population in 1851 was 48,961; in 1881 it was 48,670.

Limerick is connected by railway with Dublin and all parts of the country. It is the fourth town in importance in Ireland, and is the capital of the west, as Dublin is of the east, Belfast of the north, and Cork of the south. The city is chiefly built on the county of Limerick side of the river. The island on which the old town of Limerick stands was probably selected as the site of a city from the circumstance of this being the first point at which the Shannon is fordable above its estuary. The island, called King's Island, is about a mile in length, by from a quarter to half a mile in breadth, and lies nearly north and south, having the main stream of the Shannon, about 500 feet in width, on the western side, and a smaller branch, called the Abbey River, of an average breadth of 200 feet, on the east and south. This portion of Limerick is named English-town. Another portion, known as Irishtown, occupies the southern bank of the river, and another suburb, called Newtown Perry, entirely of modern erection, occupies elevated ground parallel with the river, below the union of its two branches, and derives its name from the Perry family, who were owners of the land. A suburb, called Thomond Gate, is situated on the county of Clare side of the river, at the end of Thomond Bridge, which was formerly the only entrance to the ancient city, and was defended by a strong castle. There are five bridges over the river, one of which, the Wellesley bridge, a magnificent structure crossing the harbour, cost £85,000. Upon it has been erected a statue of Lord Fitzgibbon, who was killed at the battle of Balacava. The streets of Irishtown are wider than those of English-town, and the houses more modern. Newtown Perry in many parts is scarcely inferior to the best districts of Dublin, with spacious streets, handsome houses, and well-stocked shops.

The most noteworthy public buildings are—the cathedral (founded in 1180, and rebuilt in 1490), a Roman Catholic cathedral, the fine church of the Redemptorist order, five Protestant churches, four parochial and five conventual Roman Catholic chapels, five dissenting places of worship, several public schools, the county and city court-houses and prisons, the custom-house, Barrington's Hospital, fever and lock hospital, district lunatic asylum, Mount St. Vincent Orphanage, chamber of commerce, model school, town-hall, corn and butter markets, and barracks. The important and increasing manufactures include large flax-spinning and weaving mills, lace and glove manufactories, corn mills, what is said to be the largest private military clothing establishment in existence, iron-foundries, distilleries, breweries, and tanneries. There is a patent slip for vessels of 500 tons, and three ship-building slips, and a floating dock where vessels of 1000 tons can discharge. A graving dock was opened in 1873. It was hewn out of the limestone rock, and is one of the longest and most substantial in the kingdom. The harbour extends about 1600 yards in length and 150 in

breadth, with from 2 to 9 feet at low water, and 19 at spring tides. The number of vessels registered as belonging to the port in 1885 was 80 (2700 tons). The entries and clearances each average 550 (160,000 tons) per annum. The trade of the port—consisting of imports of British manufactures, coal, turf, continental and colonial produce, and exports of corn, meal, butter, beef, and pork—is large, and still increasing. By the inland navigation of the Upper Shannon, and the Grand Canal and Royal Canal, the city has communication with Dublin, as well as with the country, for 230 miles along the course of the Upper Shannon. The corporation of Limerick consists of eight aldermen, and thirty-two councillors, elected by eight wards. The assizes for the county and city are held here, as are also quarter (county) and petty sessions. The mayor holds a court of conscience for pleas under 40s., and the assistant-barrister a civil bill court for the county and city. The city is the headquarters of the Limerick or south-western military district.

Limerick lays claim to high antiquity, and is said to have been of some importance as early as the fifth century. It was a royal seat of the kings of Thomond before the Conquest; was, in the possession of the Danes for some time, and was afterwards held by the O'Briens, kings of Munster, till the first hostile landing of the English in 1170. From this time, down to 1691, when it capitulated to the troops of William III., under Ginkell, the city had its full share of the vicissitudes and calamities caused by the wars, feuds, and rebellions to which the country was subject. The city returned two members to the House of Commons until 1885, since which it has had only one.

LIMESTONE is a rock composed essentially of carbonate of lime; this is often in the crystallized form of *calcite*, but sometimes it is in an uncrystalline state, and contains a large amount of impurity. This rock is usually classified among the sedimentary or derivative rocks; it has been produced in most cases by the secretion of carbonate of lime by animals, and is therefore of organic origin. In other instances it has been formed by the disintegration and rearrangement of pre-existing limestone strata; it is then usually more or less argillaceous or arenaceous. Some limestones are of chemical origin; they are seldom, however, of any very great extent, and are generally formed about calcareous springs.

Limestone in a popular sense is a rock which, after calcination, will slake and set. Those argillaceous limestones which produce a lime that sets under water are called **HYDRAULIC LIMESTONES**. There is no precise boundary between impure argillaceous or sandy limestones and calcareous clays and sands. They merge one into the other, so that in some cases a rock containing only a small percentage of lime might be considered a limestone. *Chalk* is a very pure limestone; it sometimes contains not more than 2 per cent. of impurities, and is composed almost entirely of entire or comminuted shells of Foraminifera; it is of Mesozoic age, and is largely developed in the British Isles. In Antrim it is somewhat abnormal, having been indurated by the basalt. The *Nummulitic limestone* is of Cainozoic age, and in its composition it is analogous to the chalk, being composed of the shells of nummulites. It extends from the Pyrenees eastward through Asia to China.

Crystalline limestones occur in the older formations, even though they have undergone but little alteration. In the archæan rocks of North America there are thick bands of very pure limestone. In the British Isles there are several bands of limestone in the Cambro-Silurian rocks, the most important being the Bala limestone. In the Upper Silurian there are several important bands, as the Wenlock or Dudley limestone, the Aymestry limestone, &c. In the Devonian rocks limestones are abundant, being largely made up of corals; but the Carboniferous age was that in which the great masses of limestone were formed.

The chief of these was the great limestone formation below the coal measures, often called the *mountain limestone*; in some cases it is very pure, containing as much as 95 per cent. of carbonate of lime. It is generally more or less crystalline, and of a gray colour from the contained organic matter. This limestone is considered to have been formed in a manner somewhat similar to that of the coral reefs of the present day; it abounds in remains of encrinites, corals, and mollusca. Some of the limestones are less pure, containing argillaceous matter and passing into shales; they are often of a very dark colour, and contain much sulphides. Native sulphur has been found in the carboniferous limestone of Galway, and lead lodes (galena) are not uncommon in this formation.

In the Permian and succeeding Mesozoic formations limestones form a very large portion of the strata; it is unnecessary to enumerate all, but the Lias limestone may be mentioned as producing excellent hydraulic lime, and the Oolites (Bath and Portland) as producing good building stone.

Marble is a crystalline limestone with a fine and close grain sufficiently hard to take a good polish. It varies greatly in colour; the white marbles have been altered sufficiently to drive off all the organic colouring; of these one of the most prized is the Carrara marble, for indoor works, and the Sicilian for exposure to the atmosphere. Some marbles are black from organic matter, others red or mottled from iron.

Some limestones contain a certain proportion of magnesia; they thus pass into *magnesian limestones* or *dolomites*. These are distinguished from ordinary limestones by their behaviour with acids. Ordinary limestones effervesce when touched with dilute acid, but dolomite does not act so unless powdered or heated. In the field, limestones can generally be distinguished by their massive structure without cleavage or lamination, and their mode of weathering into holes and caverns; in the older rocks they have generally a bluish tinge, unless when converted into white crystalline marble.

LIME-TREE or **LINDEN** (*Tilia*), a genus of plants belonging to the order TILIACEÆ. They are principally natives of Europe and America. *Tilia europæa* (the common lime-tree) is abundant in the middle and north of Europe. It is common in Great Britain. It was well known to the ancients, and is spoken of by both Theophrastus and Pliny. The wood is in considerable request; it is white, close-grained, soft, light, and smooth, and is used by cabinet-makers for a variety of purposes. It is easily worked as well as durable, and on this account has been employed for carving. Most of the fine carvings in this country, as those at Windsor Castle, the library of Trinity College, Cambridge, and at Chatsworth, are of this wood. The fibres of the bark are tough, and ropes and mats are manufactured from them. They are employed for this purpose in many parts of England, and the manufacture in Russia and Sweden forms a considerable branch of commerce. The bark is stripped from the trees in the spring, and steeped in water. It is then cut into strips to make the Russian mats of gardeners and upholsterers, or the fibres are twisted into ropes. The flowers secrete a large quantity of nectar, and exhale a delicious scent. On this account they are great favourites with bees, and when expanded are constantly beset with these insects. The honey thus procured is in great repute, and has given celebrity to Kowno, on the Niemen, in Lithuania, a small town which is surrounded by a forest of lime trees. It is chiefly used for making liqueurs. The seed of the lime possesses a large quantity of albumen, which is nutritious and perfectly innocuous.

The tree attains a great age, and many specimens celebrated for their age and size exist. At Neustadt, in Würtemberg, a prodigious individual gives its name to the

town, *Neustadt an der Linden*. It is said by Evelyn to have had in his time a trunk above 27 feet in circumference, and the diameter of the space covered by its branches to have been 403 feet. It was "set about with divers columns and monuments of stone (82 in number, and formerly above 100 more), which several princes and noble persons have adorned." He adds copies of many of the inscriptions on the columns, the oldest of which is dated 1550; and the column on which it is inscribed now supports one of the largest limbs, but was at a considerable distance from the tree 300 years ago. It is not so well suited to the smoky atmosphere of cities as the plane-tree or the elm, but the principal street in Berlin is called *Unter den Linden* from the rows of lime-trees on each side.

The European species are:—*Tilia microphylla* (small-leaved lime), a native of subalpine districts in the north of



Lime-tree (*Tilia europæa*).

Europe. In Great Britain it is common in the woods of Essex and Lincolnshire. *Tilia platyphylla* (broad-leaved lime-tree) is more common than the other species in Switzerland and the south of Europe. There are several specimens of this tree in England and Scotland, but they can scarcely be said to be wild. *Tilia alba* (white lime-tree) is a native of the woods of Hungary, and is readily distinguished from the other species by the whiteness of its leaves, which becomes especially evident when ruffled by the slightest breeze. It was introduced into this country in 1767, and there now exists several fine specimens.

The American species are—*Tilia glabra* (the black lime-tree), a native of Canada and the northern United States; in the southern states it is only found at a considerable elevation on the Alleghany Mountains. In external character it very much resembles the European species; its flowers and

leaves are, however, larger. *Tilia heterophylla* (the white American lime) is abundant in the United States. The leaves and flowers of this species are larger than any other. It seldom attains a height of more than 40 feet in its native districts, and specimens in Europe do not exceed 20 feet. It is a handsome ornamental tree, and deserving of cultivation.

LIMIT; LIMITS, THEORY OF. The word limit implies a fixed magnitude to which another and a variable magnitude may be made as nearly equal as we please, it being impossible, however, that the variable magnitude can absolutely attain, or be equal to, the fixed magnitude. Thus the sum of the series $1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16}$ approaches nearer and nearer to 2 as the number of terms are increased, but they can never become equal to 2, for the difference, though steadily diminishing, still exists. Under these circumstances, 2 is said to be the limit of the sum of the series.

LIMITATION, STATUTES OF. In all civilized countries some period of time is prescribed by statute beyond which no legal proceedings can be instituted, but the duration of this period varies greatly among different nations. Both the peace and the morals of the kingdom would be endangered if an action at law were allowed to be brought after any lapse of time, however great; for on the one side old quarrels might be raked up revengefully, and on the other vast opportunities for perjury would be afforded. Further, a wily plaintiff might deliberately hold over till his opponent's evidence had disappeared.

The Athenians held that after five years actions were barred by lapse of time; and the Romans, without being quite so rigid, had a very definite maxim that *Interest rei publice ut sit finita litio* ("It is of importance to the commonwealth that a limit should be fixed to litigation").

The English law upon this subject is set forth in numerous and important enactments, the first of which was passed in the reign of Edward I. and the latest, known as the Real Property Limitation Act, was passed in 1874, and came into operation 1st January, 1879. By virtue of these statutes actions to recover possession of house or land are required to be brought within twelve years of the last payment of rent or right to make an entry or distress. Undisputed possession for twelve years may thus transfer the ownership to the person in possession; but this is not an invariable rule, for it might happen in practice that a rightful claim could be presented after a much longer period. For instance, if A gave B a lease for thirty years, and B after the first year allowed C to enter into possession without dispute for the remainder of the term, A's right to bring an action would not expire until twelve years afterwards, so that C might be turned out after quiet possession for forty years. In the case of land, moreover, the failure to bring an action within the time allowed by law extinguishes *right* as well as *remedy*. Personal actions for trespass, for rent, or for debt on simple contract must be begun within six years from the date of the cause of action. Exception is made in favour of minors, persons of unsound mind, and others legally disqualified, whose term of six years is held to begin after the cessation of their legal disability. The effect of the statutes may in cases of debt be avoided by a subsequent acknowledgment of the debt. If a debtor, after the debt is due, renews his promise to pay it or makes an unqualified acknowledgment that it is due in writing, or pays part of the debt or interest upon it, he renews his liability from the date of such promise or acknowledgment, and cannot avail himself of the Statutes of Limitation in respect of the preceding lapse of time. Actions for assault, menace, and imprisonment are limited to four years, and actions for slander to two years. In the case of actions for the recovery of debts, fees, mercantile accounts, bills of exchange, &c., the statutes of limitation only deprive the plaintiff of his

remedy, and his *right* remains unimpaired and may be vindicated by any other legal means that are available. Express trusts, except those for payment of debts and legacies, are not within the Acts. If a customer leaves a balance at his banker's for six years, and neither adds to it nor draws from it, the banker is not liable. But if the balance is of such an amount and held under such conditions as to bear interest, then the banker is liable for six years from the date of the last addition of interest in his books.

In Scotch law a distinction is made between limitation and prescription, though the latter term is frequently used as covering both. Properly speaking limitation is the term applied when, after the lapse of a certain time, action is denied on an instrument or document of debt without regard to the actual subsistence of the debt; whereas prescription is the technical word employed when an obligation is extinguished by the lapse of forty years. Without, however, following out this nicety it may be sufficient to say that the various kinds of prescription in Scotland are the following:—(1) *Positive prescription*—By the Scotch Act 1617, c. 12, as amended by the Conveyancing Act 1871 (37 & 38 Vict. c. 94, s. 31), any *ex facie* valid irredeemable title to an estate in land duly recorded, and followed by peaceable possession for twenty years, creates an indefeasible title. Prior to the Act of 1874 the prescriptive period was forty years. (2) *Negative or long prescription*—The lapse of forty years without legal interruption cuts off all obligations. (3) *Vicennial*—The lapse of twenty years cuts off all challenge of the legal title of an heir. Holograph documents become invalid if not sued on within twenty years, unless the plaintiff can establish their verity by reference to the defendant's oath. In crimes where the offender has not been brought to trial within twenty years, it would appear that the right to prosecute determines. (4) *Decennial*—The lapse of ten years cuts off all actions between guardians and wards. (5) *Septennial*—Obligations of suretyship, termed in Scotland cautionary obligations, generally speaking fall on the lapse of seven years. (6) *Sexennial*—Six years deprives bills and promissory notes of their privileges; but the debt therein contained may thereafter be proved by the writing (granted after the six years) or by the oath of the debtor therein. (7) *Quinquennial*—After five years all claims for stipends, agricultural rents, and bargains as to movables or sums of money, provable by witnesses, can be proved only by the debtor's writing (granted after the five years) or by his oath. Inhibitions prescribe in five years. (8) *Triennial*—All claims for house rents, servants' wages, shop and tradesmen's accounts, and the like, which within three years could be proved by witnesses, can thereafter be proved only by writing (granted after the three years) or by the oath of the debtor. Actions of removing prescribe in three years from the time at which the tenant has been warned to remove. No person can be prosecuted for wrongful imprisonment after three years. Arrestments prescribe in three years. High treason suffers a triennial prescription if a true bill be not found by a grand jury against the offender within that time.

LIMITED LIABILITY. See JOINT-STOCK COMPANY.

LIM'MA (Gr. *leimma*, the remainder), one of the intervals of the ancient Pythagorean musical system. It was the "Pythagorean low semitone," the smaller of the Greek semitones in that system, and was the remainder left from a tone (major tone) after the *apotome* or Pythagorean "high sharp" had been cut off. The ratio of the *limma* is 243: 256; that of the *apotome* 2048: 2187; and together they make up the major tone, whose ratio is 8: 9.

LIMNÆ'IDÆ. See POND-SNAIL.

LIMNŌ'RIA. See GRIBBLE.

LIMOGES, the capital of the French department of Haute-Vienne, is situated on the summit and slope of a hill, on the right bank of the Vienne, which is here crossed by three bridges, 236 miles S. by W. from Paris, and had 58,007 inhabitants in 1881. It is named from the *Lemovices*, a Celtic tribe whose capital it was. By the Romans it was called *Augustoritum*, and under them it was a place of considerable importance. It was taken after a revolt, in 1370, by the Black Prince, who put 3000 of the inhabitants to the sword. The older part of the town consists of narrow and steep streets, with timber-framed houses; the more modern part contains broad and straight streets, and two handsome squares. Of the public edifices the principal are the Cathedral of St. Étienne, a fine Gothic edifice of the thirteenth century; the churches of St. Michel-des-Lions, and St. Pierre-du-Queyroix; the episcopal palace, and the beautiful fountain of Aigou-lène. The Hôtel de Ville, Bourse, Mint, public library of several thousand volumes, the cavalry barracks, the prefect's residence, the theatre, and the hospitals, also deserve notice.

Limoges is the seat of a bishop, whose diocese includes the departments of Creuse and Haute-Vienne; and of a high court and university academy, the jurisdictions of which comprehend the departments of Haute-Vienne, Corrèze, and Creuse. In the city are societies of agriculture, arts, and sciences, and a school of commerce; it has an amphitheatre and various other antiquities. It was once strongly fortified. A great number of books are printed in Limoges; and the manufacture of fine and coarse woollen cloths, paper, porcelain, and crucibles is important. Flannel, cotton handkerchiefs, glue, nails, woollen yarn, paper-hangings, articles in papier-mâché, &c., are also made. There is, besides, a considerable commerce in corn, chestnuts, wine, brandy, liqueurs, iron, copper, tin, kaolin, &c. Marshal Jourdan and Dupuytren, the famous surgeon, were natives of Limoges.

Limoges Enamels.—These celebrated works of art have been renowned for centuries. An account of them is given in the article ENAMEL, and some specimens are figured in the Plate accompanying that article.

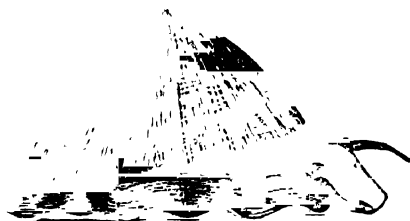
LIMONITE is hydrated ferric oxide occurring in an amorphous form. It has usually a brown, or black, or yellow colour, but gives a yellowish-brown streak; hence it is often known as brown iron ore or brown hematite. It has a hardness of about 5 and specific gravity of about 4. The different forms in which this mineral occurs are known by special names, such as brown and yellow ochres, bog-iron ore, gossan, &c., besides others. It occurs in rocks of all ages, but is generally considered to result from the alteration of pre-existing iron ore, and is frequently deposited from solution in stalactitic and botryoidal forms. It is a very valuable ore of iron when free from sulphur and phosphorus; but the former is usually present in limonites derived from the decomposition of pyritous ores, and the latter in bog-iron ores.

LIMOUSIN, one of the old French provinces which now form the departments of CORRÈZE and Haute-Vienne. Limousin was united to the French crown by Henry IV., who inherited it from his mother, Jeanne d'Albret.

LIMPET (Patellidae) is a family of molluscs belonging to the order GASTEROPODA. The body of the limpet is more or less circular or conical, and furnished with a large flat foot. The head is distinct, furnished with tentacles, each of which bears at its base a minute pit-like eye. The shell is conical, with the apex curved forwards. The muscular impression is in the form of a horse-shoe, opening forwards. The typical molluscan gills are present in a very rudimentary state, and have no branchial function. Their place is taken by a series of plate-like folds of the mantle, extending all round its inner edge. The renal organs are paired, but one is small. There is only one

auricle to the heart. The *odontophore* or lingual ribbon is very long and powerful, the common limpet having 160 rows of teeth, with twelve in each row.

The Common or Rock Limpet (*Patella vulgata*) is very abundant on British coasts. It inhabits rocks between tide-marks, and consequently is left dry twice a day. The limpets adhere very firmly to rocks, and have the power of excavating a hole in them, which varies in depth



Common Limpet (*Patella vulgata*).

according to the softness or hardness of the rock. On hard limestones the depressions are shallow, and can only be formed by adult limpets, and the margin of the shell often fits exactly the inequalities of the rock. When the tide rises and its habitation is covered with water, the limpet quits its attachment and crawls off in search of food, which consists of minute seaweeds encrusting the rocks. After feeding it always returns to its original attachment, and consequently must have some power of memory. The rock limpet passes through the ciliated larval condition which is known as the *trochosphere*, and takes several years to attain maturity. It is used as food in the north of Ireland. Many millions are annually used as bait by fishermen.

The species are numerous, both recent and fossil. The Bonnet-limpets (CALYPTRIDÆ) and the KEY-HOLE LIMPS (Fissurellidæ) belong to distinct families.

LIMULUS. See KING-CRAB.

LINACRE or **LYNAKER**, THOMAS, a distinguished physician and scholar, was born at Canterbury about the year 1160. He was chosen a fellow of All Souls' College, Oxford, in 1181. Shortly afterwards he visited Italy and studied at Bologna, Florence, and Padua, where he took the degree of doctor of medicine. On his return in 1501 he was appointed tutor to Prince Arthur. On the accession of Henry VIII. he was appointed king's physician, and became the acknowledged head of the medical profession in London. He took orders in 1507, a circumstance which enabled him to combine the ecclesiastical and medical professions, and he held successively the benefices of Mersham, Hawkhurst, Holsworthy, and Wigan, and the prebends of Wells, York, and Westminster. He died at London, 20th October, 1524. As a scholar Linacre applied himself particularly to the works of Aristotle and Galen, and is said to have been the first Englishman who read them in the original Greek. He established two lectures on physic in the University of Oxford, and one in that of Cambridge, which subsequently lapsed through mismanagement; but the Oxford foundation was revived by the university commissioners in 1836 in the form of the Linacre professorship of anatomy. He was also the prime mover in founding the College of Physicians in London, for which he obtained letters patent in 1518 from Henry VIII.

LINCOLN, an English county, is bounded N. by the estuary of the Humber, N.W. by Yorkshire, W. by Nottinghamshire, S.W. by Leicestershire and Rutlandshire, S. by Northamptonshire, S.E. by Cambridgeshire and Norfolk, and E. by the German Ocean. The greatest length north to south is 75 miles; the greatest breadth east to west is 50 miles. The total area is 1,767,962 acres, of

which 1,510,000 were under crops of different kinds according to the agricultural returns issued in 1885. The population in 1881 was 469,991.

Coast-line and Surface.—The coast, from the Welland to the Humber, forms a tolerably regular curve convex to the sea, and is low and marshy except about Clea Ness, near Grimsby, where it rises into cliffs. A belt of sand of varying breadth skirts the land. From the mouth of the Welland to that of the Nene the coast is so low as to require the protection of a sea-wall or bank. The estuary of the Wash is occupied for the most part by sand-banks, dry at low water. Between these banks the streams which flow into the estuary have their channels; and two portions of deeper water, named Boston Deep and Lynn Deep, also occur between them.

A considerable part of Lincolnshire consists of alluvium, constituting a vast extent of flat or marsh land, from the border of which the subjacent strata rise and form comparatively elevated tracts. The alluvial soil occupies nearly the whole of the coast; and in some places it extends half across the width of the county.

From Barton-upon-Humber to Bugh, near Wainfleet, stretches a line of chalk downs, called the Wolds of Lincolnshire. These downs sink on the north and east beneath the alluvium described above. Along the coast north and south of Saltfleet are natural outlets of water called provincially "blow wells," deep circular pits, which furnish a continual flow of water, and are vulgarly reputed to be unfathomable; they are presumed to communicate with the chalk. The green-sand forms a narrow belt, skirting the chalks on the west side of the Wolds; and the iron-sand occupies a narrow belt adjacent to it. Westward of the iron-sand extends a wide flat, occupied mostly by the Oxford clay; this district forms a large central valley separating the Wolds, with the adjacent hills, from the higher grounds formed of the oolitic strata, which extend southward through the county from the marshes which line the Humber. These higher grounds form part of what have been termed the Stonebrash Hills, and separate the valleys of the Ancholme and the Lower Witham from those of the Trent and the Upper Witham. The remaining part of the county is occupied by the lias, except a little of the new red sandstone in the north-west corner.

Hydrographic System.—The Trent, for about 16 miles, separates the counties of Lincoln and Nottingham: from below Grimsborough to its junction with the York-line Ouse, its course of 19 miles is almost entirely within the borders of Lincolnshire. This river is navigable throughout that part which belongs to this county. The Idle, the Bykerdike, and the Tame flow into the Trent. The Ancholme rises near Spidlington, and flows past Bishop Briggs to the Humber near Barton; there is a straight artificial cut of 20 miles to aid the navigation. The Tetney is formed by two streams which rise near Market Rasen, and flows into the German Ocean between Grimsby and Saltfleet. The Ludd rises near the south-west escarpment of the chalk range; it is formed by the junction of two or three brooks which unite above Louth and flow north-east into the German Ocean by several arms. The Louth navigation consists partly of this river and partly of an artificial cut. The Witham flows into the German Ocean at Saltfleet, and the Steeping at Spilsby.

South of Wainfleet the fen district commences; and from the extensive system of draining that has been carried on, the hydrography of the county becomes very complicated. The rivers have in several places been diverted from their natural beds, and now flow in artificial channels in direct lines, or are connected with artificial cuts, forming a very complete scheme of intercommunication.

The Witham, the most important river in the county, rises near the village of Thistleton, just within the border

of Rutlandshire, and flows past Grantham, Lincoln, and Tattershall to Boston, below which town it flows into the Wash. The length of the Witham is about 80 miles, during the course of which it receives the waters of the Brant, Langworth, South Beck, Bain, Sleaford River, and the Waring, Scrivelsby, and Enderby Becks. Many of these minor streams are united by artificial cuts. The Welland rises in Northamptonshire, and flows past Stamford, Deeping, Crowland, whence there are two branches, the Old and New Welland, to the Wash. The Glen rises near Grantham, and flows into the Wash near the mouth of the Welland.

A general account of the great fen district of England, and of the changes which it has undergone, is given elsewhere. [See BEDFORD LEVEL.] The northern fens are described in AXHOLME. The artificial cuts or drains are very numerous; they are called by the several names of cuts, drains, leams, droves, becks, eans, and dykes. The chief among them, in this county, are the Car Dyke, the South Forty-foot, the North Forty-foot, the East Fen Drain, the West Fen Drain, the Old and New Hammond Becks, and the Shire Drain.

Of navigable canals, besides the Ancholme, Louth, Horn-castle, Sleaford, Bourn, and other navigations, there are only two. One of them, the Foss Dyke, is probably a Roman work, and appears to have been used for navigation previous to the Conquest. Henry I. had it cleaned out and the navigation improved. It extends from the Trent to the Witham. The other canal is the Stainforth and Keadby Canal, which connects the Trent with the Don.

Soil and Agriculture.—The soil varies greatly in different districts. In some places it is rich and productive, and in others so poor as to weary the patience and industry of the most persevering. But the grazing land in this county cannot be surpassed in its capabilities for fattening cattle; and some of the drained fens and warp-lands along the rivers possess a high degree of fertility when cultivated. The finest pastures are fed off by horses, which are fattened for the markets; but horses soon deteriorate the grass, while sheep improve it. Very little hay is made in the county; the grass is mostly eaten in a green state.

Except Yorkshire, Lincolnshire has the largest area under corn crops of any county in the kingdom, while the fens afford some of our broadest and richest pastures. A large extent of fen has lately been brought under cultivation, and comparatively little now remains in a wild state. The fen farms are large, and are held by men of capital and enterprise. Drainage is thoroughly understood and carefully carried out, while the best methods of culture are generally practised, and implements of the most approved kind employed. The farmers of Lincolnshire are intelligent and skilful, and the farming is on a level with that of any other county.

According to the agricultural returns issued in 1885 there were in the county 600,000 acres devoted to the growth of corn, the chief crops being wheat, 240,000 acres; barley, 190,000; oats, 110,000. The green crops occupied 230,000 acres, clover and other artificial grasses under rotation occupied 170,000 acres, and permanent pasture 460,000 acres. The live stock consisted of 220,000 head of cattle and 1,300,000 sheep.

There is some wood cultivated in the neighbourhood of Boston on rich warp-land, some sainfoin grown on the chalky soils, and lucerne on the richer. Cabbages and carrots are cultivated to a considerable extent; the former on the heavy clays, and the latter on the light and deep sands.

One of the most effectual improvements on land by the side of rivers in which the tide flows rapidly is that of warping, or in other words retaining the water on the land until it deposits a layer of sand and mud. The warping is effected by letting in the water of the rivers,

which have a muddy current, by artificial channels and sluices, and retaining it there till low water. The river Humber carries off, in its course over various soils, all the finer particles which are too light to be immediately deposited. These consist of every kind of earth and portions of vegetable and animal matter, and are in such quantity that a layer one-tenth of an inch in thickness is often deposited between one tide and the next. Thus in a very short time a new soil is formed of any depth which may be desired, provided the land lies below the level of the river at high tides. Besides creating a soil, the warping fills up all inequalities, and a perfectly level surface is produced. The soil thus produced is of extreme fertility.

In a county which contains such rich pastures it is of great importance that the breed of cattle and sheep be of the most profitable kind; accordingly we find that no county possesses finer breeds of horses, oxen, and sheep. There are not many dairies in Lincolnshire; breeding and fattening are considered more profitable and less troublesome. There is, however, some excellent cheese made of the Stilton kind.

The manufactures of the county are of secondary importance, but they have been increasing of late years. In the manufacture of agricultural implements and steam-engines for agricultural use Lincolnshire has attained considerable celebrity. Except some shipbuilding carried on at the ports, the other manufactures are mainly such as belong to an agricultural country. The commerce of the county has within the last few years increased considerably, but is still comparatively small. Of natural products sulphate of lime, or gypsum, is largely worked in the Isle of Axholme; chalk is obtained on the cliffs of the Humber, and is used for agricultural purposes, or made into whiting; freestone is quarried extensively, and Ancaster stone is extensively used for churches and other public buildings.

Divisions, &c.—Lincolnshire has long been divided into three parts, which are termed Lindsey, Kesteven, and Holland. Lindsey is by far the largest, and comprehends all that part of the county which lies north-east of a line drawn from Clifton-upon-Trent to Lincoln, thence by the Witham to near Boston, and from just above that town to the sea between Boston and Wainfleet. The name Lindsey, like that of the county, is derived from *Lindum*, the Roman name of Lincoln. Kesteven embraces the south-western part of the county, and Holland (or Hollow-Land) comprehends the remainder, including the greater part of the fens. Lincolnshire is further divided into wapentakes, hundreds, and soke. It is in the diocese of Lincoln, and in the Midland circuit, the assizes being held in Lincoln. For parliamentary purposes the county is divided, under the Redistribution of Seats Act of 1885, into seven constituencies, each returning one member.

History and Antiquities.—Under the Saxons Lindsey, a name which perhaps applied to a district equal to the modern county of Lincoln, appears to have been a subordinate state dependent upon the kingdom of Mercia. Under the Danes it suffered greatly. The narrative of their ravages, given in the pages of the apocryphal *Ingulfus*, is interesting, and if its authenticity could be depended on would throw considerable light upon the historic darkness of the period. The county passed permanently into Danish hands about 877; it constituted part of the territory of the Danish burghs of Lincoln and Stamford, and was included within the boundary of the Danelagh (the Danish jurisdiction), as settled by the treaty between Alfred and Guthrum the Dane. In time, however, the Danish and Anglo-Saxon population became amalgamated, and the whole district passed under the supremacy of the Anglo-Saxon crown.

In the civil war between Stephen and the Empress Maud Lincolnshire was the scene of frequent contests. In the broils in which Henry II. was involved with his children,

one of the Mowbrays, who had a castle in the Isle of Axholme, and was an adherent of the insurgent Prince Henry, was compelled to submit to the Lincolnshire men. In the civil war of the barons with John and his son, Henry III., Lincoln was signalized by a second battle, which seated Henry III., yet a boy, securely on the throne. In the latter part of his reign, when troubles had again broken out, Axholme became once more the refuge of the disaffected. In the civil war of the Roses Lincolnshire does not appear to have suffered; but in the reign of Edward IV. an insurrection occurred in the county, in which the Lincolnshire men were defeated with great loss. At the time of the Reformation they again broke out into rebellion upon the suppression of the monasteries in 1536; but the insurrection was soon crushed.

In the civil war of Charles I. this county was the scene of several important events; engagements were fought, in 1642-3-4, at or near Grantham, Ancaster, Gainsborough, Horncastle, and Lincoln.

Of the ecclesiastical and baronial edifices which were erected between the Conquest and the Reformation, Lincolnshire contains many admirable specimens, especially churches. The Cathedral of Lincoln, and the churches of Louth, Sleaford, and Spalding are among the principal. Of monastic edifices there are several remains.

Sir Isaac Newton was born at Woolsthorpe, near Grantham, and John Wesley was a native of Epworth. Lord Tunnyson is also a native of the county.

LINCOLN, the capital of the above county, a city and a county of a city, a municipal and parliamentary borough, is situated on the north bank of the Witham, 158 miles from London by the Great Northern Railway. It stands on the line of the Roman road called *ITINUM STRETER*, and derives its name from its occupying the site of the Roman station (*colonia* or "coln") of Lindum. It was fortified by the Saxons, and at the Domesday survey was one of the richest cities of England. The town was annexed to the duchy of Lancaster at the end of the thirteenth century. In the civil wars of Charles I. the king came to Lincoln, and convened the nobility and freeholders of the county. The inhabitants promised to support the royal cause, but in 1643 the city was in the hands of the parliamentarians.

The city is built on the southern slope and at the foot of a hill, on whose summit stands the cathedral. It is irregularly laid out: the principal street is along the road from London to Barton-on-Humber, which traverses the entire city, crossing the Witham by a bridge, and running up the hill crowned by the cathedral. This street also extends a considerable length south of the Witham. The most interesting of the public buildings is the cathedral, which has two transepts, a central tower at the intersection of the larger transept, and two western towers. It has been erected at different periods, and underwent some renovation in 1869-70. The predominant style is the Early English. Fuller remarks that the floor of this church is higher than the tops of most churches. The nave is very fine, and the piers in this part are peculiarly rich. The entire length, in the interior, is 182 feet; the height of the vaulting of the nave is 80 feet. The new bell, which is larger and heavier than the old bell called Tom of Lincoln, is 6 feet 10½ inches in diameter at the mouth, and weighs 5 tons 8 cwt.—the old one weighed nearly a ton less. It had formerly many costly sepulchres and monumental records; but at the Reformation they were either pulled down or defaced, so that, in 1519, scarcely a perfect tomb remained; and the little they left undestroyed was demolished by Cromwell's soldiers, by whom the cathedral was converted into barracks. The ruins of the bishop's palace, which was destroyed at the last-mentioned epoch, stand south of the church, and comprise a fine hall, an old gateway, and part of the kitchen. Among the tombs yet in a tolerably perfect state are those of Catherine

Swynford, wife of John of Gaunt, duke of Lancaster, and of their daughter Joan. There are thirteen other churches, and about twenty chapels of various denominations, a blue-coat school, diocesan, national, British, and other schools, a school of art, with nearly 300 students, a mechanics' institute, with large library and museum, a theatre, and assembly rooms. There are also a post-office, a neat Italian Gothic edifice; a corn exchange, and a cattle market. The remains of the castle, built in 1085, stand on the hill west of the cathedral: they consist chiefly of the outer walls and the gateway tower. The site of the interior of the castle is occupied by the county gaol and court-house, which were rebuilt some years ago by Sir R. Smirke. The Guildhall dates from the reign of Henry VIII. Lincoln abounds in monastic and other remains of ancient architecture. There are several ancient gateways, as Newport Gate, the arch of which is Roman; the Chequer or Exchequer Gate in the Cathedral Close, and the Stonebow in the High Street. The remains of John of Gaunt's Palace, and of a building called John of Gaunt's Stables, present some interesting Norman and Early English features.

Lincoln is chiefly dependent upon its retail trade, but the manufactures have been considerably extended, the most important being that of agricultural implements. The works of Messrs. Clayton and Shuttleworth are among the largest in the kingdom. There are besides several large breweries, forty malt-houses, extensive tanneries, corn, seed, and bone mills, boatbuilding yards, rope-walks, coach factories, and cooperages. Brayford Water forms a convenient harbour for vessels built to navigate the Witham.

The municipal borough is governed by six aldermen and eighteen councillors. The parliamentary borough, which is co-extensive with it, formerly returned two members, but was deprived of one by the Redistribution of Seats Act passed in 1885. The population in 1881 was 37,312.

LINCOLN, ABRAHAM, President of the United States of America during the most momentous period of their history since the time of Washington, was the grandson of Abraham Lincoln, killed by Indians in 1781, and the son of Thomas Lincoln, of Virginia, by his wife, Nancy Hanks. He was born, 12th February, 1809, in Hardin County, Kentucky. His father, Thomas Lincoln, when the young Abraham was about eight years of age, removed with his family to Spencer County, Indiana. There for the next twelve years Abraham shared in the ordinary pursuits of a settler, living in the log-hut which they built when they first came to the neighbourhood. He had not, however, during all these years the guiding hand of his mother, for she died shortly after they took up their residence in Indiana. In course of time, a Mr. Crawford came to settle in the neighbourhood, and opened a school in his own cabin, and Abraham Lincoln became a pupil. Abraham was a youth of manifold qualifications: he had perseverance, a desire for knowledge, truthfulness, and earnestness. The books which he loved to peruse at this period were Bunyan's "Pilgrim's Progress;" "Æsop's Fables;" a life of Henry Clay, afterwards his model of an upright statesman; and Weem's "Life of Washington." When he was nineteen he made a trip to New Orleans in a flat-boat, with the son of one of his neighbours, with a cargo for the New Orleans market. In addition to a long voyage down the river Ohio, which bounds Indiana on the south, the young voyagers had at least 1000 miles of the Mississippi to traverse before they arrived at their destination. The voyage was successful, and raised the character of Abraham Lincoln in the vicinity as a youth of energy and promise. In 1830, when about twenty-one years of age, he migrated once more with his father to Decatur, Illinois. Here he helped to build the family log-hut; and with a single assistant performed the feat of splitting 8000 rails in a day, which obtained him the popular sobriquet of the "Rail-splitter." He afterwards started

on his own account, hiring himself out first of all as a farm hand, and occasionally acting as a clerk in a store. When the war with the Indians broke out in 1832, commonly called the Black Hawk War, Lincoln was elected to the command of a company of volunteers. After his military career he kept a store, and subsequently took to the business of a surveyor. In 1834 he was sent to the local legislature, and during the time the House was not sitting he applied himself with vigour to the study of law. In 1836 he obtained a license to practise; and in 1837 went to Springfield, the chief town in Illinois, and commenced as a lawyer, in partnership with the Hon. John F. Stuart. He rose rapidly in public favour, and is said to have been very successful as an advocate in jury trials. In 1846 he was returned to Congress, and took his seat as the only Whig member from Illinois. He continued to belong to Congress till 1849. The Whigs were the forerunners of the present powerful Republican party, the chief point of difference being that of slavery. Lincoln was for freedom, and on that ground opposed the Mexican war. He supported a bill abolishing slavery in the district of Columbia. When the Wilmot proviso was discussed to exclude slavery from those territories which had been captured from Mexico, Lincoln voted for the proviso; and he afterwards stated that, in one way or another, he had cast his vote about forty times in favour of the abolition of slavery. In 1849 he stood, and was defeated, for the office of United States senator for Illinois, and consequently remained at home from that period until 1854 in the practice of his profession. In that year the Kansas-Nebraska Bill was passed by the slaveholding party, aided by some of their supporters in the north. Stephen A. Douglas stood for United States senator from Illinois, and Mr. Lincoln opposed him; the two champions ultimately holding seven joint debates in different towns of the state for the purpose of informing the people of the grounds of difference of policy upon which they were called to decide. Upon his discussions with Douglas, however, the eyes of the whole country were fixed, and the ability and quaint humour which Lincoln exhibited, and the success which he gained for the party, made him very popular among the Republicans. The immediate practical question which then agitated the people, and which came to be the turning-point of the presidential election of 1860, was whether or not slavery ought to be permitted in the new territories, as one by one they were included in the Union. Lincoln believed that slavery ought to be excluded from the territories, although he did not see his way to interfere with slavery in those states where it existed. The Republican Convention, which met at Chicago, nominated Lincoln as their candidate for the presidency. The contest lay between him and Seward. The canvass was carried on with the usual good humour in the North, but amid threatenings and mutterings in the South in the prospect of their defeat. The polling resulted in the return of Mr. Lincoln—the numbers being, for Lincoln, 1,857,910; for Douglas, 1,291,574; for Breckenridge, 850,082; and for Bell (a Whig of long standing), 616,121. The election, in 1860, of Lincoln was hailed with delight by the people of the northern states, and when he proceeded to Washington to execute the functions of president, the whole country watched his progress with intense satisfaction. He was installed in the president's chair 4th March, 1861. His election by a sectional vote and on a sectional issue hostile to the South, was followed by a secession of eleven southern states, and a war for the restoration of the Union. Lincoln's policy was to woo the South to submission to the constitutionally-expressed will of the people by every argument which would be supposed to have weight with American citizens. His appeal was vain, and he had no choice but to enforce the laws and to use all the powers of the constitution for the suppression of the South. For

the details of the terrible civil war that followed the reader is referred to the article UNITED STATES. As a military measure, Lincoln proclaimed (1st January, 1863) the freedom of all slaves in the rebel states, and afterwards the absolute freedom of the negroes throughout the country. He was re-elected as president in 1865, and after conducting the war to a successful issue, and witnessing the complete defeat of the Confederate or Southern forces, he fell the victim of one of the foulest and most daring acts of assassination whose record has ever disgraced the pages of history. President Lincoln died on the 15th April, 1865, from the effects of a shot fired at him by John Wilkes Booth, in Ford's Theatre, Washington, on the previous evening. He left a widow and family.

Lincoln in his character and career represents the finest type of the New-World Englishman. Thoughtful, clear sighted, and earnest of purpose, he found, in spite of his early disadvantages, his true vocation in public life, and by his consistency and uprightness ever justified the confidence imposed in him. Called by his countrymen to take the helm at a time when the great ship of state was entering the fiercest storm that ever strained her timbers, his prudence, patience, courage, and invincible determination proved of inestimable service to the Union, and through the Union to the greater cause of humanity. Clear through all the dust, turmoil, and confusion of the strife he discerned the great principles that were at stake, and it is even yet too early to estimate at their true value the services he rendered to freedom and the great principle of national self-government. As a patriot, statesman, liberator, and martyr his memory will ever be fondly cherished, not only by his countrymen, but, in addition, by all those who recognize the kinship which is derived from a common race and language.

LINCOLN'S INN, one of the four English Inns of Court having the exclusive right of calling persons to the English bar, or rather to the degree of barrister-at-law. It became an Inn of Court in 1310, occupying premises which had belonged to the Earl of Lincoln; hence its name. The other Inns of Court are the Inner Temple, the Middle Temple, and Gray's Inn. See INNS OF COURT.

LIN'DEN. See LIME-TREE.

LIN'DISFARNE. See HOLY ISLAND.

LINDSAY, SIR DAVID, one of the earliest glories of Scottish literature, was born in 1490. His father was the grandson of Lord Lindsay of Byres, and inherited a small estate in Haddingtonshire, a little to the north-west of Cupar, Fife. Dunbar had (in 1503) produced his fine poem of the "Thistle and the Rose," upon the occasion of the marriage of Margaret of England (daughter of Henry VII.) to James IV. of Scotland, about the time when young Lindsay was going to St. Andrews. Lindsay left the College of St. Salvador, then the only college in that university, in 1507, and took service at the Scottish court. His father had died shortly before, and Lindsay inherited his estate. He was engaged in the fatal fight at Flodden (1513), which left a baby of a year old king of Scotland, for James IV. fell on the field. Lindsay had been named guardian of the infant, but the English party soon separated him from his charge. When young James grew up and strove for his emancipation, the patriotic Lindsay was ever by his side, the bravest and most trusted of his counsellors. He served him not only as statesman, but as poet and friendly preacher. "Lindsay's Dream" (1528), a long poem of 1134 lines in Chaucerian metre, is a very noble allegorical poem. In the preface to the poem the good Sir David reminds his young master how

"Quhen thou wes young I bure ye in myne arm
Full tenderlie, till thou begouth to gang,
And in thy bed oft happit thee full warm."

The poem is a vigorous warning to the king that "John the Common Weal" was about to leave the land where so

few cared for him, and where there was such want of justice, policy, firmness, and peace, through the long-continued misery and anarchy.

Lindsay's next poem was "The Complaint," written in 1529, in 510 lines of octosyllables, again reminding the king of his care of his baby years, in lines whose grace three and a half centuries and more have not impaired—

"As ane chapman bers his back
I bure thy Grace upon my back,
And sometimes straddlings on my neck
Dandand with mony a bend and beek.
The first syllabys that thou did mure
Was *Pu-Du-Lu*" [Father David Lindsay], &c.

Perhaps Lindsay had been somewhat overlooked, or "The Complaint" may have been only a poetical device; at any rate, he was knighted the next year, and made Lyon king-at-arms, with a good salary.

In his next poem, written in 1530, Lindsay began to earn his proud title of "Poet of the Scottish Reformation." The "Testament of the Papingo" (popinjay or parrot), in 1183 lines of Chaucerian metre, hits hard at the ill-deeds of the corrupt Roman Catholic clergy of the time, under the guise of the raven, the kite, and the magpie, who threaten the dying parrot into making them her executors. The fall of Wolsey in England and Angus in Scotland are held up as examples, and the moral deduced that there is no constant court but one, where Christ is King, whose time is interminable, and whose high glory is never gone.

Lindsay married a Douglas in 1533. In 1535 he produced the most interesting of all his poems, the morality play, "A Satire of the Three Estates," where the public needs of the country are pitifully set forth, and the remedy shown by allegory and by direct exhortation. A powerful and impressive stand is here made for the English Bible and the other main points of the reformers; and yet there are passages of very great indecency, so that one wonders that it was a favourite at court. Several smaller poems mark the next few years, also filled by state duties, such as the home-bringing of the French queen, Magdalen, who died so pitifully almost as soon as she reached Scotland. Lindsay wrote a "Deposition of Queen Magdalen" (1536); but he had before long (1538) to tune his lute to greet a new queen, the daughter of the house of Guise, whose alliance was to cost France so dear by the French and Catholic elements it introduced into the life of the child she bore to James, that child whom we know as Mary Queen of Scots.

From 1544 to 1546 Sir David Lindsay sat in the Scottish Parliament as member for Cupar. In the latter year occurred the murder of David Beaton, archbishop of St. Andrews, which set Lindsay upon his poem "The Tragedie of the unquhile maist reverend father David, be the mercy of God, Cardinal and Archibyschope of Sanct Androuis," where he makes the ghost call his brother prelates to take warning by his end. It was at this time that the brave old reformer induced his younger friend, John Knox, then forty-one, to begin his wondrous career of preaching, for both of them joined the "Castilians," men who had taken and now held the castle of the murdered archbishop, and were supported there by supplies from the English king, Henry VIII., who sent them succours by sea. In August, 1547, a French squadron obliged the garrison to capitulate, and the eloquent preacher, whose words had so long kept up the courage of his comrades, was made to serve two years at the galleys.

Lindsay did not suffer so evil a fate as Knox. He consoled himself in the growing evils of his country by his whimsical burlesque poem of the "Historie of Squire William Meldrum;" but his merrier mood soon passed, and his last poem, "The Monarchie" (1553), is his longest and gravest. It is "a dialogue betwixt experience and a courtier of the miserable estate of the world," bidding the

rulers and priests Christianize the laws (now, alas, without a king), and remember that Scotland was suffering pestilence, war, and famine for sin. The Word of God must be taught before this punishment could be expected to cease. In the year that Lindsay died (1555) his famous satire, "The Three Estates," was acted for the last time before the queen and court.

It will have been seen that Lindsay was a prolific poet. He was also a truly national poet, and an earnest and authoritative exponent of the vital forces moving the better spirits of his time and country. His poems abound in racy descriptions of the life of his day, but his broad humour is sometimes pushed rather far. His sarcastic lines and pithy sayings became proverbial even in his lifetime, and long lingered among his countrymen.

LINEÆ is an order of plants containing the most useful of textile plants, FLAX. It belongs to the series Geraniales of POLYPETALE, thus being closely allied to Geraniaceæ, the geranium order. The calyx is in five (sometimes four) parts, imbricate; petals of the same number, hypogynous. There is no disc. The stamens are generally of the same number as the petals, sometimes with staminedes. The ovary is entire, with three to five cells, each cell generally with two ovules. The embryo is usually straight in fleshy albumen. The species are herbs or shrubs, rarely trees, mostly with alternate undivided leaves, which often have stipules.

Besides the flax there is another very interesting plant in this order (*Erythrorhizon coca*), the leaves of which contain a stimulating principle, and are chewed by the natives in Peru. *Linum usitatissimum* (the common flax) is found in the British Isles as an escape from cultivation. *Linum catharticum* (purgative flax) is used still in some parts of the country as a cathartic, the usual dose being a handful of the fresh herb infused in water or whey, or boiled in ale. *Linum perenne* is a rare plant in chalky places in England. It was at one time tried as a substitute for common flax, but the fibres are coarser. *Linum angustifolium* occurs in the south of England and Ireland. A species of another genus is found in the British Isles, namely, *Radiola hibernica* (all-seed or flax-seed).

The seeds of *Linum usitatissimum* yield several articles useful in medicine and surgery. The testa, or husk of the seeds, is very mucilaginous, the kernel contains much oil, and the farina or meal procured by grinding or bruising the seeds, after the oil has been expressed, furnishes an excellent material for poultices. But the great value of this species is in its cultivation for the production of flax.

LINEN AND LINEN MANUFACTURES. The fibres covering of the flax plant [see FLAX], twisted into threads and woven as an interlaced network so as to produce a compact fabric, has been employed from the most remote periods as a material for clothing. The plant is found in every quarter of the globe, and has been cultivated from a period long anterior to all written history. In Europe bundles of prepared flax have been found in the remains of the Swiss LAKE DWELLINGS, and until the close of the eighteenth century linen manufacture was perhaps the most extensive and widely practised of the domestic industries of the whole Continent. Going back to a period still more remote we find the production of linen occupied an important place among the manufactures of ancient Egypt. We find allusions to it in the earliest books of the Old Testament, and Herodotus and other authorities frequently refer to the skill which the Egyptians had acquired in weaving fabrics of fine linen. Considerable quantities were prepared in that country for home use and for export, the centre of the trade being at the city of Panopolis. Not only were the woven cloths exported, but there was a large trade in linen yarn, and we find that a royal monopoly of this trade was established by Solomon in his own country. In Egypt itself the priests were obliged to clothe themselves in linen

garments, and we learn from Exod. xxviii. 42, that linen breeches also formed part of the official dress of the Hebrew priests. The bandages with which the Egyptians wrapped the bodies of the dead have been proved by microscopic examination to consist of linen, and among these bandages every description of quality has been found, from the fine linen resembling the finest lawn of the present day, to a coarse fabric similar to sackcloth.

The weaving processes employed in the manufacture were evidently not so perfect as the spinning. The webs are usually found to consist of scarf-like pieces about six yards long, and the whole length of the web was probably stretched in a frame as at present by the native manufacturers of the East. In a fragment of mummy cloth given by Belzoni to Mr. Thompson, of Clitheroe, the warp contained ninety threads to an inch, the weft only forty-four. Mr. Thompson ascribed this peculiarity to the difficulty of getting in the weft when the shuttle was thrown by hand. In modern cloths the proportions of warp and weft are nearly equal. A specimen of cloth taken from the body of a mummy over 4000 years old in the museum of the Natural History Society of Belfast, was submitted to the examination of a flax merchant, who reported that under the 37-inch glass used by linen manufacturers "it counted seventeen in the warp and nine in the weft, and was composed of yarn evenly and well twisted. The flax used was fine in quality, and prepared for spinning in the most careful manner. The warp is equal to about what we know as 50^s, and the weft about 80^s. The fabric is not one that would be woven at the present day, as for a 17th linen 90^s warp and 110^s weft would be used." The Egyptians had the art of introducing into the edgings of their fine linen threads of blue and fawn colours, dyed in the yarn, and some of the cloths are found with broad borders dyed blue, such as are worn at the present day in Nubia, and manufactured by the successors of the ancient weavers of Egypt. In the early times of Greece and Rome linen was regarded rather as an article of luxury than for common use, and confined to female dress; but as civilization and refinement advanced, its value as a healthy material for clothing became more generally recognized, and we find that, under the emperors, the Romans had become manufacturers as well as importers of the more delicate fabrics from the Eastern looms.

The spindle and distaff, such as are to be seen represented on the walls of the tombs of ancient Egypt, and to which there are so many references in the Old Testament, were until comparatively modern times the sole instruments employed in preparing the flax fibres for the weaver. The introduction of the common hand-spinning wheel was the first departure from patriarchal methods, and until about the end of the eighteenth century all the flax fibre produced in Europe was spun by this simple mode. At that period the production of linen in most countries, as in some parts of Europe, notably Russia, at the present day, was merely a rural manufacture of a purely domestic character.

The farmer not only cultivated the flax plant, but steeped and dressed the flax, the female members of his household plied the wheel, while his sons wove the threads into linen. Improvements, however, were going forward in every department of industry, and the ingenious application of automatic machinery by which Hargreaves and Arkwright had revolutionized the process of cotton spinning, was in 1787 brought to bear by two Durham mechanics, Kendrew and Porthouse, on the manufacture of flax. The earliest attempts in England were made at Darlington, and works were subsequently erected at Leeds, which has now become the headquarters of the flax trade of England.

In Ireland the manufacture of linen claims the most remote antiquity. Even at an early period the linen merchants of Ireland appear to have found a market for their goods, as at present, in the great towns of England. In

1272 we find Irish linen at Winchester, and about the same period the ancient poem on "The Battle of Down" describes the followers of O'Neill as wearing fine linen shirts. From the time of Charles I. the importance of the trade attracted the attention of the English government; and in 1639 the Earl of Strafford, then chief governor, by introducing flax seed and skilled workmen from the Continent, and by the enactment of severe laws for the regulation of the processes employed, endeavoured to promote improvement in the manufacture. The production of linen was encouraged by means of a system of bounties by several successive governments, but the trade received its greatest impetus from the settlement in Ireland of some of the Protestant families forced to flee from France by the revocation of the Edict of Nantes. Among these were several linen manufacturers who were encouraged by liberal grants from the government to devote themselves to the improvement of the various processes. The introduction of machinery was resisted in Ireland for a long period, and until 1828 Belfast, which is now the metropolis of the flax industry of the United Kingdom, did not possess a single flax mill. In that year, however, new machinery was introduced, and the trade, which had been languishing, quickly revived. As the raw material was produced in abundance on the spot, the Irish manufacturers were enabled rapidly to outstrip those of the sister countries, and to compete on the most favourable terms with such continental countries as were dependent upon the ancient system of hand-spinning. The manufacturers of France, Holland, and Belgium, however, who had long enjoyed a well-deserved reputation for the production of the finer qualities, were stimulated by the competition to make strenuous efforts to maintain their position, and the manufacture of linen still forms a prominent feature among the industries of these countries.

The chief kinds of linen manufactures besides yarn and thread are of fine qualities, lawn, cambric, damasks, and handkerchiefs; among the cloths of medium weight are included duck, huckaback, crash, ticking, dowias, Osnaburg low sheetings, and brown linens; heavy fabrics include sailcloth, canvas, tarpaulin, sacking, and carpeting. Plain, bleached linens, including the materials for underclothing, collars, and bed sheets, form a class by themselves. In Great Britain, Dundee and Arbroath may be regarded as the centres of the heavy linen trade; damasks are chiefly produced in Dunfermline, Perth, and Barnsley; medium goods form the staple of most of the linen-producing districts throughout the kingdom; while the finer qualities are chiefly made in Ireland, in the counties of Antrim, Down, and Armagh. For a long period lawn was exclusively a French production, but it is now made of the most excellent quality in the north of Ireland.

There are employed spinning flax in Ireland about 800,000 spindles; Scotland, 250,000; England, 185,000; and looms for weaving in Ireland about 23,000; Scotland, 16,000; England, 4000.

Within recent years the manufactures of flax and hemp have undergone some modification through the introduction of jute. At first this was only used for the coarsest kinds of textiles, but now it is mixed with cotton, flax, flax codilla or tow, hemp, and hemp codilla, in the production of goods of better quality, while for a more extended class, second only in quality to flax, it is used alone. Sheetings, Osnaburgs, packsheets, baggings, sackings, sacks, and wool-pack cloths, are made of it in immense quantities. Many experiments and adjustments were necessary to adapt flax machinery to the spinning of jute, but it is now done with comparative ease.

Notwithstanding this the linen trade, after cotton, coal, and iron, still remains the most important in the United Kingdom. No record is kept of the very large quantity used at home, but according to the official returns for

1884, the exports of linen yarn and manufactures were valued at over £5,300,000, viz.:—

Linen yarn,	£1,136,716
Piece goods of all kinds,	4,361,836
Thread for sewing,	311,928
Other articles,	504,415
Total,	£6,314,925

The largest quantities are sent to the United States, the West Indies, Australia, Germany, France, and British North America.

LINES. In mathematics lines are supposed to indicate length only; they are held as possessing length without breadth or thickness, although the necessities of representation compel their having substantial characters as we know them on paper. But this does not affect the reasoning which disregards their actual thickness. A line is mathematically considered to be made up of an infinite number of points contiguous to one another, or to represent the intersection of two planes (as the edge of a cube, &c.) The chief varieties of lines are straight lines (or right lines), which give the shortest distance between two points, curves, combinations of straight lines and of curves, or of both; and straight lines may be horizontal, vertical, or oblique; or with regard to other straight lines may be parallel, perpendicular, or oblique.

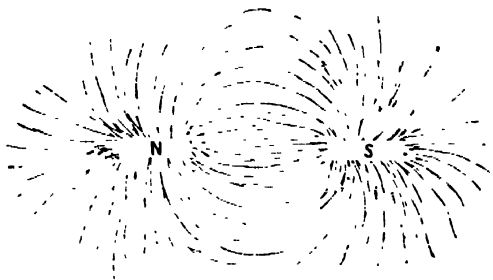
The term *line* was formerly often used as a measure of length; it then meant the twelfth of an inch. It is now superseded by decimals of an inch as a term for expressing very small lengths.

LINES OF ENTRENCHMENT. See FORTIFICATION.

LINES OF FORCE. *Electric.*—Let a charge of electricity be collected on a small sphere, then as the force exerted by such a charge falls off as the square of the distance increases, it is manifest that there are spheres of equipotential surfaces surrounding that charge, which may roughly be compared to the coats of an onion. The electric force, whether of attraction or repulsion, always acts across the equipotential surfaces in a direction normal (perpendicular) to those surfaces, and the lines formed by these normals are called *lines of electric force*. In the case of the sphere taken above, the lines of force would be straight lines, radii of the equipotential spheres; but in nearly all cases, seeing that the electric charge is hardly ever contained by a sphere, the lines of force are curved; and in this case the resultant force would be in the direction of the tangent to the curve at that point. Two lines of force cannot cut one another, as the resultant force at a point cannot act in two directions at once. It is often convenient to consider a space bounded by lines of force, and this is called a *tube of electric force*. In the case of our sphere, all the space round it might be regarded as mapped out into long cones of *tubes of force*, with their apices at the charged sphere; and this shows the reason of the rule governing tubes of force, that "the total electric force exerted at any section of a tube of a force is a constant quantity," the area increasing just as the intensity (or potential) of the force diminishes.

Magnetic.—The magnetic force so much resembles the electric in its general laws that *magnetic lines of force* may be defined very much as electric lines of force. The direction of magnetic force at a point may be defined as the direction in which a small needle would place its lines of poles if suspended at that point; and *lines of magnetic force* are those lines to which the direction of magnetic force are tangential. These lines of force may be shown in a beautiful manner by placing a sheet of glass coated with gum over a magnet, and sifting fine iron filings over the glass. If the glass be now tapped lightly the filings will settle along the lines of magnetic force like so many little

magnets, and a jet of steam will soften the gum so as to fix them in their places as the gum hardens again, or a sheet of paper may be pressed upon the whole surface and the pattern thus removed from the glass. If *N* and *S* are



the poles of a horseshoe magnet, the appearance of such a prepared sheet, after the filings have set, will be as in the figure. There is always a tension along the lines of force and a pressure across them. The lines are seen to diverge nearly radially from each pole, and to curve round to meet those from the opposite pole. Their closeness gives an indication of the intensity of the magnetic force at any given point of the field.

LING. See HEATH.

LING (*Molea vulgaris*) is a fish belonging to the cod family, or GADIDÆ. The ling has the body elongated and covered with very small scales; two dorsal fins, the first of which is somewhat elongated; a single long anal fin, and a separate caudal rounded at its extremity. There is a single barbel on the chin. There are numerous small teeth in the upper jaw, but in the lower jaw they are long, large, and form a single row; and large teeth are also found on the vomers. Except for the presence of these large teeth, the ling agrees closely with the BURNOR (*Lota*). The usual length of the ling is from 3 to 4 feet, but specimens are often taken exceeding that length considerably. The back and sides are of an olive-gray colour, and the belly is of a silvery whiteness. The ventrals are white, and the dorsal and anal fins are edged with the same colour; the caudal is marked near its tip with a transverse black bar, the extremities being white. The ling is common on the northern coasts of Europe, Iceland, and Greenland. It is taken in abundance on the west coast of Cornwall, chiefly in January and February. It is also taken along the west coast of England, extending to the Hebrides and Orkney, and on all the coasts of Ireland, and is less commonly taken on the Yorkshire coast. It is caught both with long line and hand line.

The ling is sometimes eaten fresh, but is most generally salted or dried. It is exported in large numbers to Germany, Spain, and Italy. The oil extracted from the liver was formerly used for lamps by the poorer classes, and even now is sometimes used as medicine, like cod-liver oil. The ling feeds on various kinds of fish.

LINGARD, DR. JOHN, the Roman Catholic historian of England, was born at Winchester on the 5th of February, 1771. After receiving the rudiments of education under the parental roof, he was placed, while still very young, in the celebrated Roman Catholic seminary at Douai. Here he displayed great natural acumen, an untiring perseverance, and a passionate love of study; while he necessarily imbibed those religious principles which coloured all his later life, and infused so strong a theological leaven into all his writings. On his return to England he embraced historical pursuits with extraordinary ardour, and, the first among English writers, directed his attention to the stores of information accumulated in the national records and state papers. In 1806 he made his first appear-

ance as an author. He was then in priest's orders at Newcastle-on-Tyne, and he published there his "Antiquities of the Anglo-Saxon Church," of which a third and greatly enlarged edition appeared in 1845. This was followed by the *magnum opus* which will hand his name down to posterity, "The History of England, from the first Invasion of the Romans to the year 1673." Though to some extent superseded by the more comprehensive and elaborate research of Freeman, Froude, Green, and Gairdner, it will always enjoy a deserved reputation for its learning, method, and intelligence; for the new paths of historical inquiry which it opened up; and because it provides us with the views of an able Roman Catholic on many controverted points of English history. Where not biassed by his religious tenets, his judgments are eminently impartial. His facts are arrayed with care and discrimination, and his style is lucid and dignified. Several editions of the History have been published. Lingard died at Hornby, 17th July, 1851. For several years before his death he had enjoyed a pension of £300 per annum from the crown.

LINGUALS is a term often applied by philologists to the consonantal sounds *sh*, *zh*, in classifications of the alphabet according to the organs which produce the sound. The full classification is into gutturals, palatals, linguals, labials, dentals. The words *precious*, *azure*, which are phonetically *prishus*, *azhur*, give good examples of the two English linguals.

LINGULA is a genus of BRACHIOPODA, of which it was one of the earliest representatives, having existed as far back as the Lower Silurian epoch; it survives to the present day, though not in British or European seas. There are sixteen recent species known, all natives of the seas of warm climates, where they are found perforating the mud of shallow bays, or dwelling in mud or sandy mud in some of the harbours. Lingula is now confined to south-east Asia, Australia, and West America; but the fossil species, of which ninety-one have been described, have been found chiefly in Europe, North America, and Tibet. The shell is horny and flexible, and usually of a greenish or olive colour. The valves are thin, oblong, depressed, nearly equal, held together by muscles, and supported by a thick peduncle, which comes out between them. The mantle is highly vascular, and has its margins fringed with horny bristles. The oral arms are long and fleshy. The only other genus placed in the family Lingulidæ is *Obolus*, which is extinct, occurring in the Lower and Upper Silurian in England, Sweden, Russia, and the United States.

LINGULA FLAGS is the name applied to the lower member of the Upper Cambrians in Wales. These strata have been so called from the occurrence in them of *Lingulella Darwini* in great numbers; they attain a maximum development of about 5000 feet, and are very uniform in character, consisting of black and gray slates and flag, with beds of grits and sandstones. They are well developed in Merionethshire, Carnarvonshire, and at St. David's, but further north Sir A. C. Ramsay considers these beds have been overlapped by the Arenig slates. The Lingula flags rest conformably on the Menevian beds (Lower Cambrians), and they graduate upwards into the succeeding Tremadoc slates. They have a characteristic suite of fossils, embracing about seventy species. The most characteristic are, the trilobites, *Paradoxioides Darwini* and *Conocoryphe bucephala*; a brachiopod, *Orthia lenticularis*; and the phylloped crustacean, *Hymenocaris vermicauda*. Besides these the following genera may be mentioned—among trilobites, *Agnostus*, *Dikelocephalus*, and *Olenus*; heteropods, *Bellerophon*; pteropods, *Theca*, and some annelids and Polyzoa.

Among the Lingula beds in some places intrusive bosses of diorite and felspathic traps occur, but no true interbedded volcanic rocks are found.

LINIMENTS (Lat. *linire*, to besmear) are medicinal applications which are only used externally. Formerly the name was used to designate only such ointments as were of equal consistency with oil, which therefore could be rubbed into the skin more readily than ordinary ointments. Being compounds of oils and alkalies they were chemically of the nature of soap. The term is now used to include, in addition to such preparations, all strong tinctures which are employed for external use only. They are used to alleviate pain, to allay inflammation, to heal raw surfaces and burns, for counter-irritation, and as a means of introducing remedial agents into the system through the pores of the skin. Among the more important are *Aconite and Chloroform Liniment*, a very powerful application made by mixing two parts of aconite liniment with one part of chloroform liniment, used for painting the skin in cases of severe neuralgia; *Belladonna and Chloroform Liniment*, one part of the former to two of the latter, also used to relieve acute neuralgia; *Liniment of Ammonia*, or hartshorn and oil, a mixture of solution of ammonia and olive oil, used to relieve neuralgia, rheumatism, and sore throat; *Soap Liniment*, made of soap, camphor, and spirits of rosemary, used for sprains, bruises, rheumatic pains, &c.; *Liniment of Lime*, or Carron oil, a mixture of equal quantities of olive or linseed oil and lime water, a very useful application for burns and scalds; *Camphor Liniment*, consisting of camphor dissolved in olive oil, used to relieve pain in tie-douloureux and rheumatism; and *Simple Liniment*, which is made of four parts of olive oil and one part of white wax, used to soften the skin and promote the healing of chaps. In addition to these there are liniments which are used to procure blistering, such as those of mustard, or the more powerful croton oil, and others, like the *Liniment hydragryi* and *Liniment iodi*, which are used to produce the constitutional effects of their active ingredients.

LINLITHGOW or WEST LOTHIAN, a county of Scotland, is bounded N. by the Frith of Forth, W., S.W., and N.W. by Stirlingshire and Lanarkshire, and S. and S.E. by Edinburghshire, from which it is separated by the rivers Breich and Almond. Its greatest length is nearly 21 miles, and its greatest breadth somewhat exceeds 10 miles. The area is 81,113 acres, about three-fourths of which are arable. The population in 1881 was 43,510.

The surface of the county presents as a whole a very pleasing variety of scenery. Along the coast the land is flat and level, further inland the county becomes broken by numerous hills, rising pretty steeply, in many cases, to as much as 1000 feet. These are pierced from east to west by an irregular valley, which forms a natural course for the railways and other channels of communication. On the borders of the eastern portion of the county is a great extent of elevated moorland. Notwithstanding the hilly nature of the land, it is wonderfully fertile and well cultivated, and the northern portion of the county is beautifully wooded. The strata of the county are included in those belonging to the Carboniferous system, and afford valuable coal seams, which are worked at Bathgate, Bo'ness, Linlithgow, and other places. Large quantities of ironstone, rich oil-bearing shales, which give extensive employment to several large paraffin works, and sandstone, fire-clay, whinstone, limestone, and freestone. The coal mines are said to have been known and worked in the times of the Romans, and forty shafts yielded over 500,000 tons in 1884. Ironstone is raised to the extent of over 170,000 tons per annum, and oil-bearing shale to the extent of 350,000 tons. Everywhere throughout the county there are signs of volcanic activity. Agriculture and stock and dairy farming are carried on after the most approved scientific methods. The county is drained by the border rivers, the Almond and the Avon and their tributaries, and a few small streams that flow direct into the frith. The county contains thirteen

parishes and parts of two others, all included in the presbytery of Linlithgow and the synod of Lothian and Tweeddale. It sends one representative to the House of Commons.

In 81 A.D., when Agricola carried the Roman conquests into Scotland, the *Damnonii* are said to have been the inhabitants of the county. It was nearly all included within the limits of Antonine's Wall, and there were Roman camps or settlements at Abercorn and Blackness. After the departure of the Romans, it was conquered by Edwin of Northumbria in 617, and became included in the Scottish kingdom by the conquests of Kenneth Macalpine about 1020. At Abercorn there was a monastery as early as 675, but the religious foundations of the county were not very numerous. The chief antiquities are standing-stones near Abercorn, Bathgate, and Torphichen and Dalnony Church, the castles of Abercorn, Bannockburn, Blackness, Bridgehouse, Dundas, Mannerston, and Niddry, and the palace of Linlithgow.

LINLITHGOW, the capital of the above county, is a royal burgh, and a place of great antiquity. It is 17 miles west by north from Edinburgh, and 117 from London by the North British Railway. The town is situated on the south side of Linlithgow Loch, which is a mile long, and about a quarter of a mile broad in the widest part. The town consists chiefly of one long street, which contains the county buildings and a town-house. There is a county hall, Free church, erected in 1871, two United Presbyterian churches, a Congregational and a Roman Catholic church, several schools, a masonic hall, a mechanics' institute, postal telegraph office, and branch banks. The parish church was erected about the thirteenth century, but was afterwards much enlarged and repaired. This, which is one of the best specimens of Gothic architecture in Scotland, is 182 feet in length, 100 in breadth, including the aisles, and 90 in height, exclusive of the steeple; the latter rising about 110 feet above ground, firmly terminated in an imperial crown. The exterior had formerly a row of statues, of which one only remains, that of St. Michael, the tutelary saint of the burgh. The part now used was restored and repaired in 1871. It was in an aisle of this church that the apparition is said to have appeared to James IV. that warned him against the expedition into England which terminated in the fatal battle of Flodden. The town has long been celebrated for its wells, the most important of which is the hexagonal Cross Well, in front of the town-house, about 20 feet in height, and surmounted by a unicorn supporting the arms of Scotland. The sculpture by which it is adorned is very complex, and the water is made to pour in great profusion from the mouths of thirteen grotesque figures. This well, constructed in 1807, is said to be a fac-simile of one previously existing, constructed about 1535. The town is well supplied with water, and is governed by a provost, three bailies, a dean of guild, a treasurer, and nine councillors. The Edinburgh and Glasgow Railway passes through Linlithgow. It is included in the Falkirk parliamentary district. The population of the burgh in 1881 was 3913; of the entire parish, 5619. There are two distilleries and a brewery, but the trade and manufactures are unimportant, weaving and tanning being the only industries.

The palace stands on an eminence projecting into the lake. This magnificent ruin is of a quadrangular form. It was begun as early as the twelfth century, and was greatly enlarged and improved by James V.; but was not finished till the reign of James VI. (James I. of England), who built the north side of the quadrangle, after his visit to Scotland in 1617. The west side of the palace is the most ancient, and here the apartment is still pointed out where the unfortunate Queen Mary first saw the light on the 7th of December, 1542. The palace was entire and habitable till 1746, when it was burned, either intentionally or

through accident, by the troops under General Hawley. It covers an acre of ground, and though roofless, ruined, and desolate, its appearance sufficiently justifies the not very poetical eulogium of Scott—

"Of all the palaces so fair,
Built for the royal dwelling,
In Scotland, far beyond compare
Lindilghow is excellent."
—*Marmion*, canto 4, stanza 15.

The town has been identified with the Roman station of *Linlum*, but on insufficient grounds. It is, however, very ancient. The place was of some importance when the authorities were compelled to swear fealty to Edward I. in 1296, who erected a castle about 1301, which forms a part of the present palace ruins. From the middle of the fifteenth century the town with its palace seems to have formed the jointure properly of wives of the Scottish kings, and hence has occupied a prominent place in the historical annals of the country. It was when passing through this town, on the 23rd January, 1570, that the Regent Murray (illegitimate brother of Queen Mary) was shot by Hamilton of Bothwellhaugh, partly in revenge for a private injury and partly from political motives. The house whence the shot was fired has been taken down and replaced by a modern edifice. The White or Carmelite Friars had a monastery here, founded in 1290; but all traces of it have disappeared.

LINNÆUS (the Latinized name of *Karl von Linné*) was born at Råshult, in the province of Småland, in Sweden, 23rd May, 1707. His father was a country clergyman.

In 1727 he repaired to the University of Lund in order to study medicine, and was received into the house of Dr. Ström, a physician possessing a fine library and a considerable knowledge of natural history. In 1728 he passed the vacation at home, and there formed the resolution of prosecuting his studies at Upsal. To meet the expenses of his academical education, his father was unable to allow him a larger sum than £8 sterling; he consequently suffered much privation, and in vain endeavoured to increase his income by procuring private pupils. His circumstances, however, were somewhat improved by a royal scholarship awarded him on the 16th of December, 1728. He diligently persevered in attendance upon the courses of lectures connected with his future profession—the more diligently perhaps because of his poverty; and by the end of 1729 the clouds of adversity began to disperse. By this time he had become known to Dr. Olaus Celsius, the professor of divinity at Upsal, who was glad to avail himself of Linnæus' assistance in the preparation of his "*Hierobotanicon*," a work illustrating the plants mentioned in the Holy Scriptures. His new friend procured him private pupils, and introduced him to the acquaintance of Rudbeck, the professor of botany, then growing old, who appointed him his deputy lecturer, received him into his house as a tutor to his younger children, and gave him free access to a very fine library and collection of drawings.

Here he began to sketch those works which were afterwards published under the titles of "*Bibliotheca Botanica*," "*Classes Plantarum*," "*Critica Botanica*," and "*Genera Plantarum*," and perceived the importance of reducing into order and the unmethodical, barbarous, confused, and prolix writings with which he was surrounded. In the year 1731 Linnæus quitted the house of Rudbeck, and on the 12th of May, 1732, proceeded, under royal authority and at the expense of the University of Upsal, upon a journey into Lapland. The result of this journey was his "*Flora Laponica*." In the beginning of 1735 he set out upon his travels in search of some university where he could obtain the degree of doctor in medicine at the least expense, in order that he might be able to practise physic for a livelihood. He accomplished his purpose at Harderwijk in Holland, 23rd June, 1735.

In Holland Linnæus formed a close friendship with

Dr. John Burmann, professor of botany at Amsterdam, and it was during his stay with that botanist that he printed his "*Fundamenta Botanica*," a small octavo of thirty-six pages, which is one of the most philosophical of his writings. At this time he was introduced to Mr. Clifford, a wealthy Dutch banker, who possessed a fine garden and library at a place called Hartecamp. This gentleman engaged the Swede to arrange the objects of natural history contained in his museum, and the plants in his garden and herbarium; and assisted him in the publication of a descriptive catalogue, the "*Hortus Cliffortiannus*." It was during his engagement at Hartecamp that he visited England, where he seems to have been ill received by Dillenius, at that time professor of botany at Oxford, who was offended at the liberties Linnæus had taken with some of his genera; but a reconciliation was effected before the Swedish botanist returned to Holland. Towards the end of 1737 he quitted Mr. Clifford, but did not leave Holland till the following spring.

On his return to Sweden he commenced practice in Stockholm as a physician, and with the aid of a pension of 200 ducats from the government, on condition of lecturing publicly on botany and mineralogy, his prospects for the future became so satisfactory as to enable him to marry at midsummer, 1739. By this time his botanical fame had spread over all Europe, and henceforward his life was one of increasing fame and prosperity. Every branch of natural history he revised or remodelled; books and collections were sent to him from all parts of the world; his pupils, Hasselquist, Osbeck, Sparrman, Thunberg, Kalm, Lötting, and others, communicated to him the results of their travels in Europe, Asia, Africa, and America. He was named professor of medicine at Upsal in 1740, and afterwards of botany; in 1746 he received the rank and title of *archiater*; in 1757 he was raised to the nobility, and took the title of Von Linnæus; and by the year 1758 he was able to purchase the estates of Hammarby and Söfja for 80,000 Swedish dollars (about £2330 sterling).

During these eighteen years his life was one of incessant labour; besides his practice as a physician, which was extensive and lucrative, and his duties as professor, he published a most extraordinary number of works on various branches of natural history. In addition to a large number of dissertations bearing the names of his pupils, the "*Flora*" and "*Fauna Suecica*," "*Materia Medica*," edition after edition of the "*Systema Naturæ*," and numerous miscellaneous works, some of great importance, he produced his "*Philosophia Botanica*," and "*Species Plantarum*." For an account of the service he rendered to the science of his choice the reader is referred to the article **BOTANY**. Towards the latter part of his life Linnæus suffered severely in health. He died 10th January, 1778, and was buried in the cathedral at Upsal.

After the death of his son, his library and herbarium were purchased for the sum of £1000 by Sir James Edward Smith, and are now in the possession of the Linnean Society of London.

LIN'NET (*Linota cannabina*) is a well-known member of the Finch tribe. [See **FRINGILLIDÆ**.] It is very common in Britain, and inhabits almost the whole of Europe except the more northerly regions, extending into Asia as far as Turkestan. In the Canaries and Madeira, as well as in Barbary, it is found all the year round, but only occurs as a winter visitor in Egypt and Abyssinia.

According to sex and season great variations in plumage occur, so that the linnet has been described under various popular and scientific names. The following are the various popular names by which it is known—the greater red-headed linnet, the greater redpole, the rose linnet, the gray linnet, and the brown linnet. The plumage of the adult male in spring is as follows:—Feathers of the forehead and the breast of a

crimson red, terminated by a narrow border of rosy red; throat and front of the neck whitish, with longitudinal brown markings; top of the head, nape, and sides of the neck of a pure ash; back, scapulars, and wing-coverts chestnut brown; under parts whitish; some of the quills blackish, bordered externally with white; tail forked, black. Caged birds do not acquire the roseate tints in spring which adorn the plumage of the free birds. After the breeding season the roseate tints begin to fade, and gray and brown prevail. The female has the upper surface pale brown, variegated with patches of dark brown. The male is about $5\frac{1}{2}$ inches in total length; the female is rather smaller.

The linnet resorts to wild commons and hedges of furze, building its nest in a low bush. The nest is composed of small twigs and grass, and is lined with wool, sometimes with the addition of hair or feathers. The eggs are from four to six in number, bluish-white, dotted with purplish red. Towards winter linnets assemble in flocks, visiting the sea-coasts till spring calls them to return to the uplands, when they separate and pair. Numbers of them migrate southwards. Their food consists of small seeds generally, as of the flax, thistle, dandelion, &c., and particularly of those of the Compositæ. The song of the linnet, though short, possesses much sweetness, and hence this bird is very commonly kept in cages.

The Mountain Linnet or Twite (*Linota montium*) is a common species in the north of England and in Scotland, where it dwells throughout the year and breeds, but makes its appearance in our southern counties only during the winter. It is distinguished from the common linnet by its yellow bill, longer tail, and reddish-tawny throat. It measures about $5\frac{1}{2}$ inches in length. It is found in hilly and moorland districts, building among heather. The *Rhipidura* (*Egiothus*) are closely allied to the linnets.

LINOLEIC ACID or PAPAVEROLEIC ACID, an oily acid obtained from linseed and poppy oils. It is a yellow oil, having the formula $C_{18}H_{32}O_2$. The specific gravity is 0.9206. It is insoluble in water, slightly soluble in alcohol, very soluble in ether. It is a weak acid, but it forms a number of salts called linoleates. Exposed to the air it absorbs oxygen and becomes viscid, and at last dries to a varnish. It gives to these oils their siccatve properties, which are so important in painting.

LINSEED OIL may be procured by cold expression of the seeds, a process which makes the oil clearer; or the bruised seeds are roasted in the oil mills, in which case it is brownish-yellow, and easily becomes rancid, probably from attracting oxygen. Linseed oil is pellucid, with a faint but peculiar odour and taste. Specific gravity, 0.93. By long boiling it becomes dark brown, tenacious, and thickened, but dries more easily, and in this state is used for printers' ink; by still longer boiling it becomes black, almost solid, and elastically tenacious, like caoutchouc, and in this state it serves for bird-lime.

Linseed oil is used to form liniments, of which the most common is that mixed with lime-water, as an application to burns. But it is much more extensively used in the arts, particularly for painting.

LINZ, the capital of Upper Austria, is situated on the right bank of the Danube, over which there is an iron bridge 700 feet long, leading to the suburb Urfahr. The old town consists of one long street, and is of much less extent than the suburbs. There are four gates and three squares. Linz is, on the whole, a well-built city. There are many churches, the largest of which is the cathedral, and a synagogue, opened in 1877. Other remarkable buildings are—the government house; the hall in which the provincial parliament meets; the town-hall, built in 1414; the city brewery, the custom-house, the gymnasium, the theatre, and the great imperial manufactory of woollen cloths and carpets. Linz gives title to a bishop, and has

a lyceum, a public library of 34,000 volumes, several public schools, a deaf and dumb asylum, and many charitable institutions. Considerable quantities of woollen, cotton, and silk goods, leather, gold lace, cards, tobacco, &c., are made. The population is 35,000. It has a station 100 miles west from Vienna, and is a great railway centre, and its transit trade by the Danube is very considerable. Some Roman antiquities have been discovered here, and it is probably the *Lentium* of the Romans. The fortifications, now deserted, were constructed on a new plan by Prince Maximilian d'Este, and consist of a series of thirty-two detached forts, twenty-three on the right bank and nine on the left bank of the Danube, each at a distance of from 1 mile to 3 miles from the town, round which they form a circuit of 9 miles, being joined to each other by a covered way. The town and neighbourhood are celebrated for attractive beauty of scenery. Steamers ply regularly to Vienna, and in summer up the river to Passau and Ratisbon.

LION (*Felis leo*), the largest and most formidable of the existing species of the cat tribe [*FELIDÆ*]. The neck and shoulders of the male are, as a general rule, ornamented with a shaggy mane, and the tail is tufted at the end. The female has no mane. The colour of the lion is uniformly tawny, varying in intensity almost to brown; but the young are obscurely striped or blinbled. The lion, divided into several varieties, is at the present day confined to Africa, Arabia, India, Persia, and the borders of the Euphrates. Formerly this ferocious animal was common in Egypt and Syria; and not only so, but also in several portions of eastern Europe.

Of the African lions three varieties are usually distinguished:—

1. *The Lion of Barbary*.—This lion has a deep yellowish-brown fur, and the mane of the male is very much



African Lion (Barbary).

developed. It extends over the whole of Africa north of the Sahara.

2. *The Lion of Senegal* is characterized by fur of a more yellow tint; the mane in the male being less thick, and nearly wanting upon the breast and insides of the legs. It is found in Western Africa.

3. *The Cape Lion*, of which there are said to be two races, one yellowish and the other brown; the latter is regarded as the more formidable. According to a recent traveller, Mr. F. Selous ("A Hunter's Wanderings in Africa," 1881), the so-called black-maned lion of the Cape is not a distinct variety, but occurs with the yellow-maned lions, not only in the same locality, but even in the same family.

The lion is not king of the forest, but of wide plains and karos, interspersed with tracts of brushwood, as well as the borders of rivers. During the day he usually slumbers in his retreat, rousing up from his lair as night sets in, and prowling during the hours of darkness in quest of food. The larger herbivorous animals fall before him, and the horse and the ox of the settler too often become his prey; nor is man always safe from his attack, although experience has taught this fierce brute the deadly nature of fire-arms. Many astonishing details proving the enormous strength of the lion, many thrilling accounts of hair-breadth escapes, and of exciting yet fearful lion-hunts are on record; but we have not space for such narratives, and therefore refer to the works of various travellers in Africa, as Le Vaillant, Sparrman, Burchell, Steedman, Gordon Cumming, Livingstone, Baldwin, Anderson, Sir Samuel Baker, and others.

Of the Asiatic lions three varieties are distinguished:—

1. *The Bengal Lion*.—The characteristics by which the Asiatic race is distinguished from that of Southern Africa consist principally in the larger size, the more regular and graceful form, the generally darker colour, and the less extensive mane of the African.

2. *The Persian or Arabian Lion*.—This is distinguishable by the pale isabel colour of the fur.

3. *The Manches Lion of Guzerat*.—A very distinct variety was believed to inhabit Guzerat, in Western India, the only region of Hindustan in which the lion still survives. This lion is distinguished by the comparative absence of a mane from the sides of the neck and shoulders, the middle line of the back of the neck being alone furnished with longer hairs, which are erect, like those in the same situation in the Cheetah (*Felis jubata*). The under surface of the neck has long, loose, silky hairs, and there is a tuft at the angle of the anterior legs. Besides the absence of the extensive mane the body is bulkier, the legs shorter, and the tail is shorter and is furnished at its tip with a much larger tuft or brush. The distinctness of the variety is now denied, and the lions described as manches are considered to have been only young specimens. It is certain that lions from Guzerat which have lived in the London Zoological Gardens have had as fully-developed manes as any other species. In the same way with the other varieties, much of the distinctiveness of size, colour, and development of the mane may depend on the animal's age.

The habits of the Asiatic lions do not differ much from those of Africa, excepting that the former, from the state of the country, frequent the jungles. In India the elephant is generally employed in the chase; and in the accounts of most modern sportsmen in Asia, the great courage of the lion is particularly noticed. One of them states that the lions in India, instead of running away when pursued through a jungle, seldom take to cover as a refuge at all, but boldly face their foes, and have been known to bring elephant and rider to the ground.

The general anatomy of the lion has already been dealt with in the article CARNIVORA. The snout of the lion is longer and more dog-like than in the other members of the cat tribe. Another peculiarity is the "thorn," a little hardened tip of skin which is found in the centre of the tuft of hair at the end of the tail. This has given rise to the story that the lion has a claw at the end of the tail, by which, when lashing his tail, he spurs himself into fury. The size varies slightly in the different varieties. A full-sized South African lion measures about 10 feet from the snout to the tip of the tail, 3 feet of which is occupied by the tail. The lioness is about a foot smaller.

The lion is solitary and monogamous. During the day and on moonlight nights he does not hunt. His proverbial courage and magnanimity has of late been seriously called in question. The fact seems to be that he is too lazy to

kill unless hungry or attacked, and has acquired a wholesome respect for his civilized foes who carry firearms. The great African traveller Livingstone is almost alone in expressing contempt for the terrible roar which he utters. The old lions which have lost most of their teeth often become man-eaters like the tiger.

The lioness goes with young fifteen or sixteen weeks, and produces from one to six at a litter, which are born blind. The age to which the lion naturally lives is doubtful; it is generally supposed to be twenty or twenty-two years. It is not full grown till about eight years old. Hybrids have been produced in confinement between the lion and tigress.

The so-called American lion is the *PRIMA* (*Felis concolor*). The Cave Lion (*Felis spelæa*), which ranged through Britain and Europe in later Tertiary times, is not specifically distinct from *Felis leo*, though it was larger and may have had a thicker fur.

LION (constellation). See LEO.

LION, in heraldry, is a favourite device, serving as a symbol of sovereignty and power. The lions of the Royal Standard (first and fourth quarters) are due one to the dukedom of Normandy, a second to that of Maine (the Conqueror and his sons bore two lions), and a third to Aquitaine, so that Henry II. bore three lions. These *lions passant* are called by French heralds *leopards*, whence some confusion has arisen on the point. The lion of Scotland is rampant, and has a tressure round the shield studded with fleurs-de-lis, to commemorate a very ancient Scotch alliance with the Emperor Charles the Great, and in perpetual token of French protection. It is so borne on the royal arms in the second quarter.

The *Lion and Unicorn* date as supporters of the royal arms only from 1603. The unicorn was a Scotch supporter. The lion had always been one of the English supporters from the times of Edward III., the first king to use them; but the lion's mates had been very various. Edward himself used a Lion and an Eagle; Henry V. a Lion and an Antelope; Edward IV. a Lion and a Bull; Richard III. a Lion and Bear; Henry VII. a Lion and a Dragon; Henry VIII. and his children a Lion and a Greyhound. The second supporter had a family signification in these combinations, and was always "sinister." The lion was always dexter, i.e. to the *left* as one looks upon the shield. For the Lion of St. Mark see MARK, Sr.

LIONARDO DA VINCI was born at Vinci in the Val d'Arno below Florence, in 1452. His father, Pietro da Vinci, was a notary. Lionardo evinced as a boy remarkably quick abilities, particularly in arithmetic, music, and drawing. Andrea Verrocchio, the painter, took him as his pupil, and soon felt so keen a sense of his own inferiority that he gave up painting altogether. The first original picture of Lionardo, mentioned by Vasari, was the so-called *Rotella del Fico*, a round board of fig-tree, upon which, having collected almost every kind of reptile, he painted from them a monster (chimæra) of a most strikingly horrible appearance. This painting his father sold for a 100 ducats, and it was afterwards repurchased by the Duke of Milan for 300 ducats.

Although Lionardo devoted himself enthusiastically to painting, he appears to have found time to study many other arts and sciences—sculpture, architecture, engineering, and mechanics generally, botany, anatomy, mathematics, and astronomy; he was also a poet and an excellent extempore performer on the lyre. He was not only a student in these branches of knowledge, but a master, and his contemporaries are unanimous in attributing to him a perfectly resistless charm of manner. A letter which he wrote to Lodovico Sforza, the regent, afterwards Duke of Milan, probably about 1483, proposing some improvements in engineering, for both peace and war, induced that prince to take him into his service, with a salary of 500 scudi per annum.

In Milan, besides performing various services for the duke, Da Vinci established an academy of arts about 1485, and formed a great school. His first public work of art was the model for a bronze equestrian statue of Francesco Sforza. This great work had to be cast twice. It is not quite clear what became of it. By the praise of all contemporaries it must have been a glorious work. The number of studies of horses which Leonardo made for it was prodigious. When the duke went to meet Charles VIII. at Pavia in 1494, Leonardo accompanied him, and while there he studied anatomy with Marc Antonio della Torre. About 1495 he wrote a treatise upon the respective merits of painting and sculpture, and dedicated it to the duke, but it is now lost.

In 1497 he commenced his painting of the Last Supper, on a wall of the refectory of the Dominican convent of the Madonna delle Grazie. One of the best copies is that in the Royal Academy of London, made by Marco Oggioni in 1510; there are twelve old copies still extant, as well as many of the original sketches of Leonardo. The demolition of the original was completed at the time of the Revolution, by some French soldiers. It is needless to say that this is probably the grandest and best known work of Christian art, for there can be scarcely any person not acquainted with it. It fixed for ever the conception of the sacred event commemorated in the crowning sacrament of the church. If a "Last Supper" is painted on any other model it is felt as unbecoming. Even in its cruel decay, with a doorway knocked through it, with touchings and retouchings till it has but little of Leonardo's left visible, it is a miracle of beauty. When the French in 1499 entered Milan, the soldiers broke up the artist's model for the statue of Francesco Sforza. After this event Leonardo returned to Florence in 1500. He was well received by Pietro Soderini, the gonfaloniere, who employed him, and assigned him an annual pension. His first great work was the cartoon of St. Anne, for the church of the Annunziata. (Now happily in the Royal Academy at London); and he executed about the same time the portrait of Madonna Lisa, now in the Louvre. In all, not quite a dozen are all that are left to us of Leonardo's paintings of every sort.

In 1502 he was appointed architect and chief-engineer to Cesare Borgia, captain-general of the Pope's army, and planned out that splendid canalization of the Po which was not carried into effect till after his death; but in 1503, after the death of Pope Alexander VI., he was again in Florence, and employed by the gonfaloniere to paint one end of the council-hall of the Palazzo Vecchio. This composition, of which we have one group preserved to us in a copy by Raffaele, was called the Battle of the Standard. In 1507 Leonardo again visited Milan, and painted between that year and 1514 several portraits and a Madonna and Child. He then went to Rome, and was introduced by Giuliano de' Medici to Leo X., who was about to employ him, but soon offended him by a want of courtesy, and perhaps still more by sending for Michelangelo, and he therefore set out for Pavia to enter into the service of Francis I. of France, who received him with the greatest kindness and took him into his service, with an annual salary of 700 crowns. Da Vinci accompanied the king to France in 1516, but his health after he left Italy was so enfeebled that he executed little or nothing. It gradually grew worse, and he died at Amboise, 2nd May, 1519.

Of Leonardo's numerous treatises few have been published. The best known is that on painting, "Trattato della Pittura," which has been twice translated into English. His greatest literary distinction, however, is derived, says Mallam, "from those short fragments of his unpublished writings that appeared not many years since; and which, according at least to our common estimate of the age in which he lived, are more like revelations of physical truths vouchsafed to a single mind than the superstructure of its reasoning upon any established basis. The dis-

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coveries which made Galileo, and Kepler, and Maestlin, and Maurolicus, and Castelli, and other names illustrious, the system of Copernicus, the very theories of recent geologists, are anticipated by Da Vinci within the compass of a few pages, not perhaps in the most precise language, or on the most conclusive reasoning, but so as to strike us with something like the awe of preternatural knowledge." The extracts alluded to were published at Paris in 1797, by Venturi, in an essay (now rare) entitled "Essai sur les Ouvrages Physico-Mathématiques de Léonard da Vinci, avec des Fragmens tirés de ses Manuscrits apportés de l'Italie." These manuscripts were afterwards restored to Milan, where they are still preserved under the name of the "Codice Atlantico." They are now published in facsimile. The publication began in 1882. A duplicate text gives a printed version in the usual form, as Leonardo's writing is too some to read; for it all runs from right to left, a curious fancy of his which he habitually exercised.

LIPARI ISLANDS, the ancient *Æolus* or *Vulcanic Insula*, are situated between Calabria and the northern coast of Sicily. They are mentioned by the ancient geographers as seven in number. Strongylê (now Stromboli); Lipara, now Lipari; Hiera or Vulcania, now Vulcano; Didymê, now Saline; Phœnicôdes, now Felicudi; Eriocôdes, now Alicudi; and lastly Euônymos, supposed to be either Liscabianca or Panaria. At an early period they supplied abundant food for the poetic fancy of the Greeks, whose legends made these islands the abode of Æolus, ruler of the winds. Odysseus (Ulysses) is said to have visited Æolus in the course of his wanderings. In *re.c.* 579, as the number of the inhabitants had become greatly reduced, Pentathlos, a Herakleid, established on the island a colony of Cnidians and Rhodians, who had been unable to maintain themselves in the south-west angle of Sicily. The new settlers cultivated the soil in common, and defended themselves bravely against the attacks of the Etruscan pirates. Lipara, which enjoyed the friendship of Syracuse, was plundered by the Athenians. The islands afterwards suffered from the incursions of the Carthaginians. In 260 the Roman admiral, Cnaeus Cornelius Scipio, was surrounded in the harbour of Lipara, and taken prisoner by the Carthaginians. The Romans sent a colony thither, but in Cicero's time the islands were only partially cultivated. This was possibly owing to the convulsions of nature which must have occurred in *re.c.* 204, when the island of Vulcano was upheaved from beneath the sea.

There are several other smaller islands, or rather rocks, such as Liscanera, Basiluzza, &c., which belong to the same group, but are uninhabited and barren. Stromboli consists of a volcanic conical mountain nearly 2500 feet high. It rises abruptly from the sea, except on the northeast, where it has a cultivated space between it and the sea, which produces cotton and some wine, and is inhabited by about 1200 people. The island is about 12 miles in circuit. The flames of the crater are a constant light to the sailors in that sea; but no eruption has taken place for more than 2000 years. It is called by sailors the "Lighthouse of the Mediterranean." Panaria is an extinct volcano whose crater slopes on one side to the sea-shore; the bottom or funnel of it is cultivated by a few individuals, who are also fishermen. Lipari, the largest and most important island in the group, is a bishop's see, and the residence of a military governor; it is about 18 miles in circumference, and contains about 12,000 inhabitants. It has several mountains with volcanic craters now extinct; it also contains a hot spring, and is wholly composed of volcanic products. The land, which is very fertile, produces cotton, olives, grapes, and the "Malvasia di Lipari" wine. The town of Lipari, with its harbour, is on the eastern side of the island; it contains a castle, several churches, and some remains of antiquity. From fragments of a Cyclopean wall and other remains, it is con-

jectured that this was the identical Acropolis which the Romans, about 259 B.C., attempted to carry by escalade, but were repulsed and driven back with great loss by the Carthaginians under Hamilcar. Lipari is the great magazine whence Europe is supplied with pumice-stone, its surface being almost wholly composed of that singular substance. Though so abundant in that island and Vulcano, pumice-stone is not found either in the neighbourhood of Etna or in the regions of extinct volcanoes in continental Europe, and only in small quantities on Vesuvius. Vulcano is a barren deserted island, consisting entirely of mountains, the chief of which, Mount Aria, contains two craters. Salina, 16 miles in circumference, with several villages and about 4000 inhabitants, consists of two mountains separated by a deep and very fertile valley. The *Pinna marina*, from whose silky filaments the Romans made imperial robes, abounds on the shores of Salina. Filicudi, about 10 miles in circumference, produces corn, fruits, and wine. Alicudi, the most western of the Lipari group, is hilly and not very productive, has some pastures, and about 1000 inhabitants. The islands belong to Italy.

LIPPE, a German principality which takes its name from the river Lippe, a feeder of the Rhine, is now divided into **LIPPE-DETMOLD** and **SCHAUMBURG-LIPPE**, from the names of the two branches into which the ancient house of Lippe is divided.

LIPPE-DETMOLD forms a compact territory, bounded east by Hanover, north-east by Hesse-Cassel, and on the other points by Prussia. The small bailiwick of Lipperode, with the town of Lippstadt, lies detached, being entirely surrounded by Westphalia. The area of the principality is 432 square miles, and the population in 1880 was 120,216. The country is mountainous, but well wooded. The Weser, the only navigable river, just touches the northern frontier of the principality for a short distance, and receives the Hamme, the Exter, the Werre, the Beza, and some other small streams. The Ems rises in a branch of the Osnung or Teutoburgerwald Mountains, which run through the territory from south-east to north-west, and soon enters the province of Westphalia. The Lippe merely touches the bailiwick of Lipperode and the town of Lippstadt. Vast forests of oak, beech, and other timber clothe the higher parts of the mountains, while on the slopes there is the finest arable land. The climate is temperate, but the air is frequently loaded with fogs. The winter is cold and wet; the summer very hot. The chief crops are corn, flax, hemp, potatoes, rape-seed, garden vegetables, and timber. The mineral products are plaster of Paris, lime, iron, clay, marble, and fire-stone; and there is a salt spring from which nearly 10,000 bushels of salt are annually obtained. The breed of horned cattle is good; that of sheep has been much improved of late years. Swine and goats are numerous. The horses are good. The only manufactures of any importance are linen and linen yarn. The present constitution of the state dates from 1836, but was modified in 1876. Nearly all power is in the hands of the prince. The annual expenditure and revenue are about £50,000. The chief towns are Detmold, Lemgo, and Horn.

SCHAUMBURG-LIPPE, or **SCHAUBENBERG-LIPPE**, is a principality surrounded by Hanover, the Hessian part of Schaumburg, Lippe-Detmold, and Westphalia. It is 212 square miles in extent, and had a population of 35,374 in 1880. The country is mountainous; its products are similar to those of Lippe-Detmold, but in addition it has coal. To the prince belongs the whole legislative and executive authority. He acts through a minister, called the president of the government. The budget comprises an annual revenue of £25,000, and an expenditure of the like amount. There exists a public debt of about £18,000.

The reigning house of Lippe is descended from a nobleman of the same name, who lived in the thirteenth century.

It was only in 1807 that the two counts of Schaumburg-Lippe and Lippe-Detmold were elevated to the rank of princes, and became independent rulers of their estates, by espousing the cause of Napoleon, as members of the Rheinbund. They would have been struck from the list of sovereigns by the Congress of Vienna, but for the protection of Prince Metternich, who preferred having two crowned heads more in Europe to giving their territories to Prussia. Lippe-Detmold and Schaumburg-Lippe are each represented in the constitution of United Germany by one member in the Bundesrath and one member in the Reichstag.

LIPPI, FRA FILIPPO (*Lippo*), born at Florence in 1412. When he was eight years old he was received into the Carmelite convent Del Carmine. Filippo himself gave early evidence of his extraordinary ability in art by a fresco of the papal confirmation of the rules of the order of the Carmelites; he executed also several other works in various parts of the convent and its church, each work superior to his preceding effort, and so like those of Masaccio that his spirit was said to have passed into Filippo. All these works, however, or at least what remained of them, were destroyed in the conflagration of the church in 1771.

In 1430, or when only seventeen years of age, Filippo ran away from the convent, escaped by sea to Ancona, was captured by a pirate, carried in chains to Africa and sold as a slave. Eighteen months after he amused himself one day with drawing from memory his master's portrait in charcoal upon a white wall. The performance so pleased his owner that he immediately released Filippo, and after he had employed him to execute various pictures sent him back to Italy. Filippo was landed in Naples, where he remained only a few months, and then returned to Florence. One of the first works which he executed at this time was a small picture of the "Adoration of the Madonna," for the wife of Cosmo de' Medici, which is now in the Imperial Gallery at Florence. Filippo executed many excellent works at Florence, Fiesole, Arezzo, and at Prato. He definitely ranged himself on the opposite side to the art of his brother-monk and contemporary Fra Angelico. The latter headed the school of the Mystics, Fra Lippo that of the Naturalists. The first cultivated beauty only as means to an end; the last sought beauty as an end in itself. Thus began the never-ending artistic conflict. The "Death of San Bernardo," painted for the Cathedral of Prato, is one of his finest; it is still in the cathedral. Vasari terms the "Martyrdom of St. Stephen," in the same church, his masterpiece. Fra Lippo was one of the first Italians to paint successfully in oils. He is supposed to have died at Spoleto in 1469, aged fifty-seven, and is said, on doubtful evidence, to have been poisoned by the relations of Lucrezia Buti, a young Florentine novice who had eloped with him. By Lucrezia he had a son, Filippino Lippi, who was also a celebrated painter. Excellent examples of both painters are in the National Gallery. By Fra Lippo there are a fine "Vision of St. Bernard," one or two "Madonnas," especially an "Annunciation," and an altogether splendid piece, a marvel of grace and colouring, "St. John the Baptist and Six Saints." The latter of itself would immortalize the painter.

LIQUEFACTION OF GASES. It was long held that the gaseous state was not necessarily the permanent condition of certain bodies which were nevertheless only known as existing in that state, before actual liquefaction of the ordinary gases by Cailliet and Pictet demonstrated the positive truth of the reasoning. As ether, a liquid with us, is a gas in the tropics, and as sulphurous anhydride, a gas with us, is a liquid at the poles, it was argued that the same must apply to oxygen, hydrogen, &c., if only sufficient cold or sufficient pressure could be applied to them to reduce them to the liquid form.

Faraday was the first to liquefy what were then called

"permanent gases." Heating cyanide acid in a test-tube hermetically sealed he obtained liquid cyanogen, because as more and more of the gas is evolved it compresses itself in the closed vessel, and eventually reaches a point of pressure at which it can no longer remain gaseous. Thilorier, later on, made an apparatus on Faraday's principle for converting considerable quantities of carbonic acid gas into the liquid condition, generating the gas in an iron cylinder and passing it into a second cylinder, where it liquefies by its own pressure. Some dangerous accidents occurred with this apparatus, and it is now abandoned in favour of one by Natterer of Vienna. In this the gas is driven into a wrought-iron reservoir, which can resist a pressure of 600 atmospheres, by a condensing force-pump; and the reservoir is cooled from the heat of compression and friction, which the working of the apparatus naturally generates in it, by a cupful of freezing mixture that surrounds it. The reservoir can be unscrewed when full, having a self-acting valve which closes the orifice of entry. From the other end the liquid gas (if that expression is tolerable) is allowed to issue as required by means of a stopcock. When carbonic acid is liquefied in this manner, and is allowed to flow from the reservoir, but very little retains the liquid form; the rest partly flies back into gas and partly becomes solid—"carbonic acid snow"—by the great abstraction of heat due to the volatilization of the portion which has flown into gas. Solid carbonic acid volatilizes very slowly; its temperature is about 90° C. (or 162° Fahr.) below the freezing-point of water, and yet it does not feel very cold to the hand. The reason of this is its want of contact. But if a little be mixed with ether into a paste, and placed on the skin, all the effects of a severe burn are given by the rapid aerification of the compound. If a tube containing liquid carbonic acid be placed in such a mixture the liquid instantly becomes solid, and outwardly cannot be distinguished from ice. This mixture of melting carbonic acid and ether will solidify four times its own weight of mercury, and readily gives a cold of 110° C. (equivalent to 198° Fahr.) below freezing-point.

The most remarkable liquefaction producible by Natterer's apparatus is that of protoxide of nitrogen. The gas once liquefied evaporates but slowly, and produces a cold of 88° C. (or 158·4° Fahr.) below freezing-point. Liquefaction of carbonic acid gas is also to be effected by the continued evaporation of liquid ammonia under the air-pump.

Finally Caillietet and Pictet, working separately and somewhat in different lines, have liquefied both oxygen and hydrogen. Caillietet's method is to compress the gas violently, by a powerful hydraulic press, within a strong tube ending in a much finer tube above, so placed that the last-named part can be seen. When, by turning a screw, the gas gets a little release from the great pressure the cold produced by its sudden expansion is so great as to liquefy some of it, as is shown by the mist which fills and condenses in the narrow visible end of the tube. Marsh gas, binoxide of nitrogen, and oxygen itself yield to Caillietet's apparatus.

Pictet's method is to liberate the gas under great pressure combined with very great cold. To get the cold he liquefies carbonic acid by means of liquid sulphurous acid, produced by a high vacuum, and then solidifies the carbonic acid by further increasing the vacuum. The air-pumps are driven by a steam engine of 15 horse-power. The oxygen (or other gas) being produced in a strong retort ending in a copper tube which passes amid the solid carbonic acid, is liquefied by the intense cold and pressure, and when the stopcock is turned it issues in a fine purely white steam, which the polariscope shows to be slightly crystalline. With a still further degree of cold, reaching the incredible point of 140° C. (or 252° Fahr.) below freezing-point, and obtained by using protoxide of nitrogen instead of carbonic acid, Pictet liquefied hydrogen, and the new liquid violently issued in a miniature sleet, or rain with frozen particles

intermixed, and rattled loudly on the ground. The colour was steel blue.

LIQUEUR, the name applied to any alcoholic preparation which is flavoured or perfumed and sweetened for use as a beverage or in confectionery or cookery. The materials employed in the preparation of liqueurs or cordials are distilled water, white sugar, clean flavourless spirit, and flavouring ingredients. The latter include various essential oils or the aromatic substances from which they may be distilled, bitter aromatic vegetable substances, fruits, rinds, &c., or their alcoholic extracts, and fresh juicy fruits. The French makers, who enjoy a high reputation for the preparation of liqueurs of a superior quality, distinguish their cordials as "eaux" and "extraits," or liquors which, though sweetened, are entirely devoid of viscosity, and "baumes," "crèmes," and "huiles," which contain sufficient sugar to give them a syrupy consistence. The easiest method of preparing liqueurs is by adding to diluted spirit the requisite amounts of sugar, in the form of clear syrup, and of the essential oil required to impart the flavour. Where better qualities are required the flavouring ingredients, after maceration and steeping, are combined with a pure spirit of the best quality, and the liqueur is obtained by a process of careful distillation. Among the liqueurs most highly esteemed are *chambré*, which has already been noticed under that head; *chartreuse*, which is made in three qualities—green, yellow, and white, the green being the best, and the secret of which is very carefully preserved by the Carthusian monks who manufacture it; *curaçon*, the peculiar flavour of which is derived chiefly from the dried peel of the Curaçon orange; *maraschino*, which when genuine is made from the fermented and distilled juice of a particular kind of cherry—the Marasca—and flavoured with the broken cherry kernels; and *nogau*, a sweet cordial flavoured with bruised bitter almonds, or apricot or peach kernels. Among the commoner qualities used in England are *aniseed cordial*, made by flavouring weak spirit with aniseed, coriander, and fennel seed; *claret cordial*, the flavour of which is derived from bruised cloves; and *peppermint*, which is a sweetened gin flavoured with oil of peppermint. The latter is in greater demand in England than all the other cordials put together. In England liqueurs are a mere incident of a costly repast, but on the Continent they are largely used as stimulants.

LIQUIDAMBAR, a genus of plants belonging to the order HAMAMULIDÆ. The species all form fine trees, and occur in Java, the Levant, and North America. *Liquidambar styraciflua* is the species found in Mexico and the United States, in the latter of which it is called sweet gum, and forms a large and fine tree. The wood is of a hard texture and fine grain, and makes handsome furniture; but the tree is more noted for the fragrant liquid resin which exudes from incisions in the stem, though not very copiously. This is called liquidambar, or oil of liquidambar, which has a pleasant balsamic odour and an aromatic bitter taste. This, becoming dry and opaque, forms what is called soft or white liquidambar, which resembles very thick turpentine, has a feeble odour than the liquid balsam, and contains less volatile oil. The word is a contraction of *Liquidum umbar*, or liquid amber, and refers, of course, to this balsamic product. The styrax used in medicine at the present day is the product of *Liquidambar orientalis*, a tree which forms forests in the south-west part of Asia Minor.

LIQUIDS. We give the name *liquidity* to that condition of a material substance in which the particles have a perfect freedom of motion, without any sensible tendency to approach or to recede from one another, except by the action of some external power. [See FLUID; FLUIDS, ELASTIC.] When the particles of a substance are situated beyond the limits of the attractive forces existing between them, the repulsive power, arising probably from the action of heat,

causes the particles to recede continually from one another, and induces the state of aeriform fluidity; and when the particles of a substance are, from any cause, brought so near one another that the attraction of affinity is in equilibrium with the repulsive force of heat, the particles become freely movable in any direction about one another, whatever be their form; and thus may arise the condition of liquidity.

The particles of a liquid are held together with considerable force, notwithstanding their freedom of motion, since a small quantity of a liquid has a tendency to take a spherical form when at a distance from any substance for which its particles have greater affinity than for one another; this is very evident in mercury, oil, and water, the first of which, on being suffered to fall on a table, immediately divides itself into globules, and the others take a like form when a small quantity of either is suspended from a pointed extremity of any object. See also **DROR**.

LIQUORICE is the name of a leguminous plant, and also of the inspissated juice of its roots. The word liquorice is a corruption of the scientific name of a genus of plants, *Glycyrrhiza*, which means sweet root. One of the species, *Glycyrrhiza glabra*, a plant growing wild all over the south of Europe, and through Central Asia to China, produces the common liquorice roots of the shops, from which the well-known black extract of the same name is obtained. It is a native of Germany, but cultivated in some parts of Britain, especially about Pontefract, in Yorkshire, whence the name of Pontifick cakes, applied to a fine preparation of liquorice. Though commonly grown in the field, it requires very superior culture in order to produce fine roots for sale in the market. It thrives best in a rich black mould, and must be plentifully supplied with manure. Plants are either raised from seeds, or, as is more commonly the case, from a division of the old roots, which are cut into pieces 8 or 10 inches long. See **GLYCYRRHIZA**.

LIRA, the derivative of the Latin *libra*, a pound, is the Italian unit of account, brought into exact equivalence with the French franc by the law of 1862, so that Italian *lire* are current in France, Switzerland, Greece, &c., and French *francs*, &c., in Italy, to the great mutual convenience of these countries. The *lia* contains 100 centesimi, and is worth theoretically a little over 94*d*. English. The silver coin is actually worth nearly 8*d*. The old *lia* of Tuscany was worth only 7*d*., and contained twenty *soliti*. The pound Turkish is also called *lia* (figured 1. 00); it is a gold coin of the fineness of the English standard, and is worth 18*s*.

LIRIODEN'DRON. See **TUTTI-TREE**.

LIRIPIPES, the long-tailed hood which formed a favourite headgear in the nineteenth and sixteenth centuries, made of the stuff of the cloak, or very usually a part of the cloak itself.

LISBON (Portuguese, *Lisbon*; French, *Lisbonne*; German, *Lisabon*), the capital of the kingdom of Portugal, is situated on the northern bank of the Tagus, about 9 miles above the bar or entrance of the river. It rises in the form of an amphitheatre from the bank of the river, being built on a succession of hills, the highest of which are the Hill of Buenos Ayres, or Estrella, to the west, and the Castle Hill to the east. Most of the streets are steep, irregular, and tortuous, besides being ill paved and dirty, though improvement in the last respect has taken place of late years. The new town, however, built in a valley between the hills, after the earthquake of 1755, contains many fine streets. At the river's edge is a fine square, called *Praco de Commercio*, one side of which is formed by the Tagus, and the other sides by the arsenal, the custom-house, the exchange, royal library, and other public buildings. Other open places are the *Praco da Figueira*, or market-place, the *Praco do Rocio*, and the *Passeio Publico*, or promenade. The oldest part of Lisbon, east of the castle, consists of narrow streets of lofty houses,

Westward of the new streets the town ascends a slope; massive buildings, chiefly convents and churches, crown the summits of the hills and tower above all the rest. The extreme limits of Lisbon extend about 4 miles by $1\frac{1}{2}$; but many parts of the included area (3000 square acres) are occupied by extensive gardens, plantations, the naked steep declivities of the hills, and by ruins and waste ground. West of the bridge of Alcantara a line of streets parallel to the Tagus connects Lisbon with the suburb and royal residence of Belem, or Bethlehem.

The Tagus from Belem up to Lisbon is little more than a mile in width, but opposite the city it expands to 5 miles, and assumes the noble aspect of a fine estuary. The southern bank is studded with a number of small towns and villages, which supply the capital with provisions. The river affords to Lisbon a most splendid and safe harbour, which might contain all the fleets of Europe. The largest men-of-war can anchor close to the city. The entrance of the river is defended by two forts with light-houses adjacent, St. Julian on the north bank, and Bugio on a small island opposite, which is joined to the southern bank at low water.

The most striking and imposing buildings of Lisbon are its vast and massive convents, which crown the hills, and look like palaces and fortresses.

The public buildings of an old date are fewer than in most cities of Europe. The cathedral is a Romanesque edifice of the twelfth century, small and not particularly fine; the only ecclesiastical building of great interest is the exquisite convent and church of San Geronimo at Belem, formerly a distinct town, now a suburb of Lisbon. The building is a mixture of the classic and flamboyant styles, and was erected in 1500, on the spot where Vasco da Gama last stood before his departure for India (8th July, 1497), and at which he landed on his return (29th July, 1499); the suburb was before called Restilho, but was then changed by the king to Belem, that is, Bethlehem. Other fine churches in the city are San Vicente de Fora, large, lofty, and imposing, on a much finer site than the cathedral; the Carmo, greatly damaged in the earthquake, never repaired, but full of interest and imposing. There are several fine palaces, including the new Royal Palace, completed in 1864, which is a magnificent edifice; the Ajuda on a hill overlooking Belem; two small palaces in Belem; the Bemposta, north of the city, now converted into a military school; and the palace of the Cortes, or legislative chambers.

Other public buildings are the palace of the polytechnic institution, the military arsenal, the mint, custom-house, bank, cable manufactory, several theatres, the fine San José Hospital, and several others. There are also several markets, with pier, and fountains in the streets and public squares; a handsome bridge over the Alcantara; and several small but beautiful parks and cemeteries, intramural sepulture being now not permitted. The citadel or Castle of St. George (*San Jorge*) stands in the east part of the city, on one of the highest eminences; the building incloses a large space, the original Moorish city, and contains military quarters or prison, church, &c. The fort of Belem, built in the river, but now joined to the shore by a sandy isthmus, protects the entrance to the city. Fort St. Julian, 8 miles west of Belem, protects the entrance to the river. The principal literary institutions are a royal college, the royal academy of sciences, which publishes transactions; societies of national industry, for improvement of the working classes, schools of design, of navigation, artillery, and engineering, music, commerce, and shipbuilding; a museum of natural history and picture gallery, a national library, an observatory on a hill north of Belem, and a botanic garden. The situation of the city commands magnificent views of both land and water.

The climate is variable, but on the whole healthy and

genial; it is very hot (often 96°) and dry in the summer months, but is relieved by north-west winds; heavy rains fall in November and December; cold clear weather prevails in January, but in February the weather becomes mild again, and the spring begins. Snow is a very rare occurrence. Olive and orange trees, cypresses and judas trees, and some elms and poplars, grow near the city. Much of the adjacent country is covered with large gardens called "quintas," surrounded by high walls. A large house is usually attached to them, in which the families of the owners spend part of the summer.

A fine aqueduct, Os Arcos das Agoas Livres, supplies Lisbon, though somewhat scantily, with good water, brought from springs in the neighbourhood to a central reservoir, from which the water is distributed to fountains about the town, and is retailed from thence by porters.

The population of Lisbon at the last census was 216,243. Opposite the city the river is about 6 miles wide, and its harbour or roadstead is one of the finest in the world. There is a large and increasing trade, the greater part of it being carried on by British ships. Lisbon exports minerals, fruits, oils, &c.; and it imports salt-fish, salt butter, cheese, timber, iron, lead, tin, copper, coals, and all sorts of foreign manufactures. It has some manufactories of silks, paper, soap, and leather; its goldsmiths and jewellers are very expert; and there are also sugar-refineries and potteries. Lisbon is 764 miles by the shortest sea-route from Plymouth, steamers making the voyage in about three or four days.

One of the ancient names of the city is taken from the tradition that it was founded by Ulysses in his wanderings after the Trojan war. Its ancient inhabitants were a tribe called Turduli, and it fell in succession under the Phœnicians, Carthaginians, and Romans; its later name was bestowed by Julius Cæsar. From the year A.D. 409 it formed part of the Gothic empire till overthrown under Rodolph, in 713, by the Moors, under whom it was enlarged and fortified. Alfonso VI. of Leon wrested it from them in 1093; but they recovered it soon after, and held it till 1147, when it was finally conquered by the first king of Portugal, Alfonso Henriquez, with the help of 11,000 crusaders, who had arrived in the river in search of provisions. It was made the capital of Portugal by Don John I. (1385). Lisbon has frequently been visited by earthquakes, though the entire peninsula is without volcanic rocks, with the single exception of a small tract round Olot in the north of Catalonia. Slight shocks were experienced in 1009, 1117, 1146, a more violent one in 1356; in 1531 slight shocks for three successive days; in 1579 three streets were thrown down; in 1699 and 1722 there were violent undulations. The great earthquake occurred on the 1st November, 1755; and in ten minutes about 60,000 persons perished. Many were buried under the ruins of falling houses in the narrow streets; but the greatest number were swept from the Prado, on the east of the city, whither they had fled for safety, by a vast wave from the river, which had retired from its bed towards its south bank, and then returned with resistless force; the quays at the same time sank, and many large vessels lying at them were engulfed; not a fragment or a dead body was ever found after, either in the river or on the adjoining coasts. The loss of property was reckoned at £20,000,000 sterling. The focus of the shock was under the Atlantic, west of Lisbon, and so deep-seated was this focus that the earthquake was felt from Syria to Lake Superior, and from the borders of the Sahara to the Orkney Islands and south of Norway—a larger area being thus embraced than in the case of any other known earthquake. A great fire produced by the earthquake destroyed large parts of the city. Shocks were since felt of considerable violence in 1761, 1796, and 1807. In 1807 the French army, under Junot, occupied Lisbon

for a short time after their defeat at Vimiera; but they were soon driven from it by the combined Anglo-Portuguese army. Lord Wellington, in the same year, fortified the famous lines of Torres Vedras, which, in 1809, proved a sufficient defence against a fresh invasion of the French under Massena.

LISBURN, a town of Ireland, in the county of Antrim, is situated on the river Lagan, 97 miles north from Dublin, and 6½ miles south-west from Belfast. There is a cathedral church for the united sees of Down and Connor, a chapel of ease, a Roman Catholic chapel, five or six meeting-houses for dissenters, a court-house, market-house, linen-hall, and union workhouse. The town is pleasantly situated on a gently rising ground, and is one of the handsomest, cleanest, and best built towns in the north of Ireland. Very great improvements have been made within the last forty years by the Marquis of Hertford. A canal runs from Lough Neagh into the river Lagan, near the town, by which agricultural produce is conveyed to Belfast. It is also on the railway from Belfast to Armagh. The most beautiful damask is manufactured, as well as muslin and linen, though the two latter have fallen off considerably. There are extensive viticultural works on an island near the river. The population in 1881 was 10,831. Lisburn returned a member to the House of Commons until the Redistribution of Seats Act of 1885.

Lisburn, which was long an obscure place, owed its first rise to the erection of a castle by Lord Conway, about 1627. It repulsed the Irish forces under Sir Phelim O'Neil with great slaughter, at the breaking out of the rebellion of 1641, and in 1644 baffled a similar attempt by General Monroe, who, a few years afterwards, was defeated near the town by the Parliamentary forces. Shortly after the Revolution, a body of Huguenots, who emigrated from France on the revocation of the Edict of Nantes, settled here, and introduced the finer branches of the linen manufacture, to which the town is mainly indebted for its prosperity. The castle, which was burnt down with a part of the town in 1707, has never been rebuilt. Jeremy Taylor died as bishop of Lisburn in 1697, and there is a monument to him in the church.

LISIEUX, a town of France, in the Department of Calvados, formerly the capital of Lisvaine. It stands in a beautiful valley, watered by the Orbec and the Touque, 113 miles west-north-west of Paris. The road from Caen—24 miles distant—to Evreux runs through the best and widest street in the town. The other streets are narrow and winding, the houses high, and many of them old and built of wood. The Gothic cathedral, a structure of the twelfth century, which contains a beautiful Lady Chapel (built by Pierre Cauchon, bishop of Beauvais, afterwards of Lisieux, and one of the judges of Jeanne d'Arc), and the former episcopal palace, are the finest buildings in Lisieux. The old ramparts are made into promenades. The town contains 15,000 inhabitants, and has tribunals of first instance and of commerce, a college, and ecclesiastical seminary. Linen, woollen cloth, flannels, swan skins, horse covers, tape, woollen and cotton yarn, are manufactured. There are also tanyards, paper-mills, dye-houses, and fulling-mills. These products, together with corn, cider, butter, hemp, flax, and cattle, form the items of a brisk trade, which is much facilitated by the Touque, which is navigable at high water from Lisieux to its mouth. Lisieux was the Roman *Lecoriv*, whence this part is still called Pays de Lisvaine. Henry II. of England married Eleanor here (1152); and here his rebellious subject, A'Becket, came when exiled (1169).

LISKEARD, a municipal borough of England, in the county of Cornwall, is about 12 miles east by south from Bodmin, and 264 from London by the Great Western Railway. The town stands partly in a hollow and partly on rocky heights—the foundation of some houses being on

a level with the chimneys of others. The church is a handsome Gothic edifice with a modern tower, and the town-hall is a fine structure in the Italian style, resting on granite columns. There are also several handsome chapels for dissenters. The streets are very irregular, but the place has been much improved in recent times. It is the market-town of an extensive agricultural district. There are also some small manufactures of serge and leather, and a good trade in the tin, copper, and lead raised from mines in the neighbourhood. Near the town is the well of St. Keyne, which has become famous through Southey's well-known ballad of that name. The borough is governed by four aldermen and twelve councillors. The population in 1881 was 5591.

Liskeard (anciently *Lis-kerrat*, meaning a fortified post) received its charter of incorporation in 1210, from Richard, earl of Cornwall, which was subsequently confirmed by several sovereigns, and among others by Queen Elizabeth. It is one of the oldest towns of the county, and was once a place of some consequence in the duchy as the principal place for the coining and stamping of tin. It returned a member to the House of Commons until 1885.

LISMORE, a small city of Ireland, in the counties of Waterford and Cork, distant 15 miles west-north-west from Dungarvan, and beautifully situated on the south bank of the Blackwater, 3 miles from the point where that river changes its course from east to south, near Cappoquin. It is joined here by the Owenslad, a rapid stream. A handsome bridge, the centre arch of which has a span of 100 feet, crosses the main river a little above the point of junction, and leads to the city, which occupies the summit of the southern bank. At the eastern extremity of the town is the cathedral, a handsome building, with a tower and spire. It is in the later English style, and was chiefly built by the Earl of Cork in 1663. There are also a large Roman Catholic chapel, Presbyterian meeting-house, a court-house, grammar-school, bank, almshouses, dispensary, &c. This town has likewise been much improved by the dukes of Devonshire. It has little trade beyond a salmon fishery, though there is a canal from it to the point where the Blackwater becomes navigable. The castle, a magnificent pile, originally erected by King John in 1185, and greatly enlarged and strengthened by the first earl of Cork, stands on the summit of a rocky bank, which rises to the height of nearly 100 feet above the Blackwater. It is now in the possession of the Devonshire family, by whom it has been greatly improved and embellished, and is kept in a state of complete repair. This castle and an estate surrounding it formed part of the grant made to Sir Walter Raleigh. The ancient see of Lismore was joined to that of Waterford in the time of Edward III., and is now included in the united diocese of Cashel, Emly, Waterford, and Lismore. The local affairs of the town are regulated by eight commissioners. The philosopher Boyle and the poet Congreve were born here. Population in 1881, 1890.

The original name of Lismore was *Maghsciath*. During the seventh and eighth centuries the monastery, whence the present name is derived, became very celebrated as a seat of learning.

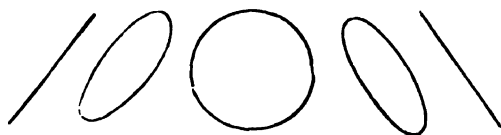
LIS SA, a fortified island in the Adriatic, belonging to Austria. It is near the Dalmatian frontier, and was the scene of an important naval engagement on 20th July, 1806, between the Italians under Admiral Persano, and the Austrians under Admiral Tegethoff. The former had twenty-three vessels, eleven of which were ironclads, the Austrians had the same number of ships, but only seven were ironclads. The Italian vessels did not keep well together, and one of the ironclads took fire and exploded, killing all on board except nineteen. Another was surrounded and sunk. One of the line-of-battle ships belonging to the Austrians was so disabled that it was obliged to

run ashore, but the victory was decidedly on their side, as they offered to renew the fight on the following morning, whilst the Italians sailed for Ancona. Admiral Persano was afterwards tried for misconduct, and dismissed the service.

LISSAJOUS' CURVES form a very beautiful means of rendering visible the vibrations of sounding bodies. In their simplest form they may be readily produced upon a screen by taking a large tuning fork, upon one prong of which a mirror is fixed (the other prong being suitably counterweighted), illuminating the mirror with an intense beam of light, and reflecting this at a suitable angle by a second mirror on to the screen. When the tuning fork is set into vibration, the waving motion of the fork is indicated by reflection as a little streak of light, the motion being converted from a to-and-fro position into an up-and-down one. If now the second mirror be turned swiftly this way and that, the band of light is thrown to this and that side of the screen, and by the well-known phenomenon of optical persistence it takes the form of a beautiful luminous ripple.

The form used by Helmholtz in his splendid researches was rather more complicated, and is styled by him a "vibration microscope." It is a doublet eyeglass fixed on to a tuning fork which is set in vibration, so that while the doublet moves up and down some sounding body is vibrating to and fro. A spot of white (as a starch grain, &c.), brilliantly illuminated, is viewed upon this vibrating body by the vibration microscope, itself also vibrating. The result is a series of beautiful closed curves, if the vibrating body is a second tuning fork. When a violin string is vibrating in unison with the fork that carries the microscope, the *ovals* and *circles* of the (second) tuning fork are altered by taking on points at top and bottom, somewhat as a Gothic arch differs from a semicircular one; for one vibrating at the octave, a more complicated figure, still curved and pointed, is produced. These figures may be drawn very carefully, and afterwards resolved into the true motions of their two components. Also they may be drawn very accurately by an apparatus (due to M. Tisley, 1874), where a drawing point is controlled by the motion of two swinging pendulums, whose length is carefully made to correspond to the sound waves of the vibration microscope and the vibrating body under examination.

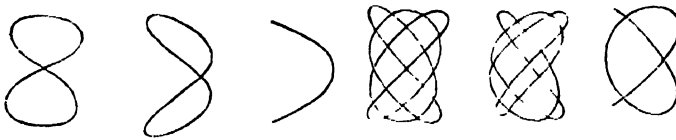
Returning to the simplest case, that of two tuning forks in exact unison, each carrying a mirror, the reflected vibration of one sounding fork held horizontally shows separately on the screen when sounding as a horizontal line, and that of the other (held vertically) as a vertical line. Their compounded reflection when both are vibrating, and the light from the first is caught upon the second, and thence reflected upon the screen, shows us an oblique line slanting upwards to the right, provided both forks are *in the same phase*, that is, when both begin a vibration precisely at the same time—a very rare case in practice. If one fork is one-eighth or seven-eighths of a vibration ahead of the



Curves of the Unison.

other, an ellipse is the result; a difference of one-fourth of a vibration gives a circle; a difference of three-eighths or five-eighths of a vibration gives an ellipse, slanting this time upwards to the left, the other ellipse having slanted to the right; and if the forks are just half a vibration apart the straight line is again reached, but this time it slants to the left, not to the right. If the forks are absolutely in unison the figures remain steadily permanent on the screen so long as the forks vibrate, because of course the difference of

phase is maintained throughout. They diminish in size as the swing of the forks diminishes and the tone grows faint, but they retain the same figure. Not so if instead of an exact unison the forks are a little out of tune, for in this case the phase will gradually alter, the fork which vibrates a trifle quicker than the other will catch it up in its phases. For instance, let one fork vibrate 440 to the second and another 441, it is manifest that if both start on a vibration together, the second will be a whole vibration ahead at the end of each second, a quarter ahead at the quarter of each second, an eighth ahead at the eighth of each second, and so on. The result of examining such a pair of forks is that the compound reflection passes through the whole series shown in the figure and back again; thus—line, ellipse, circle, ellipse (reversed), line (reversed), ellipse (reversed), circle, ellipse, line. The effect upon the mind is as if one held a hoop and turned it slowly round, at the same time rotating the poles in a plane parallel to the spectator, and is most fascinating to watch.



Curves of the Octave.

Curves of the Fourth.

The figures for the intervals of the Octave and the Fourth are given above; that is, when one fork is the Octave or the Fourth above the other. Some few of the differences of phase are indicated in fractions of a vibration. It is seen that the complexity of the curves increases rapidly as the ratios are of less simplicity.

LIS'TON, JOHN, a celebrated English comedian, was born in London in 1776. Well educated, he was for a time a teacher in Archbishop Tenison's School, but was expelled for acting with the boys. He then took to the stage and played tragedy, but soon found that comedy was his proper element. His talent being recognized by Charles Kemble, he appeared on the London stage in 1805. Among his best impersonations were those of Mawworm, Tony Lumpkin, and Bombastes Furioso, but his crowning triumph was his appearance as Paul Pry in 1825. He left the stage rather suddenly in 1837, and died 22nd March, 1846. His private life was most exemplary, and being of thrifty habits he is said to have accumulated £10,000.

LIS'TON, ROBERT, a celebrated surgeon, was born at Ecclesmachan, West Lothian, Scotland, 28th October, 1791. He studied medicine at Edinburgh, where he became a licentiate of the College of Surgeons, and commenced practice in that city in 1817. He established a lectureship on anatomy and surgery in connection with the college, and acquired a good reputation as a teacher. A profound anatomist, and combining great manual dexterity with a quick eye and great presence of mind, he soon obtained a place among the most skilful operators in Great Britain. During the time he remained in Edinburgh he took an active part in the question of hospital reform, and after much contention with the managers of the Edinburgh Infirmary, he lived to see his complaints effective and to find himself nominated one of its surgeons. In 1831 he published his "Elements of Surgery," a work which was so well received that it soon passed through several editions. In 1834 he quitted Edinburgh for London, where he was appointed surgeon to the London University Hospital. He was also elected professor of clinical surgery to that university and soon obtained a large consulting practice. In the zenith of his fame he died suddenly of aneurism, 27th December, 1847. The profession of surgery is indebted to Liston for several improvements in methods of amputation and in the dressing of wounds. In addition to

the work named he published "Practical Surgery" in 1837, and many of his lectures were printed in the *Lancet*.

LISZT, FRANZ, the famous musical composer and pianist, was born in 1811 at Raiding, in Hungary. His father was a state official, very fond of music; and as soon as he discovered the exceptional abilities of his son he embraced the offer of some noblemen to assist in the boy's thorough musical education. Liszt was sent to Vienna when only nine years old, and studied under Czerny, to such good effect that when he first played in public as a boy of twelve, in 1823, every one was enthusiastic, even Beethoven himself. Schubert also was very kind to the lad, and Salieri taught him composition. He endeavoured to enter the Paris Conservatoire, but Cherubini refused to make an exception in his favour, and his foreign origin was suffered to exclude him. Tours to Switzerland and England spread his very great reputation as a pianist, and an operetta "Don Sanche" (produced in Paris in 1825) showed his merit as a composer. His father died in 1827, and

Liszt then made his home in Paris, closely leagued with Victor Hugo, Lamartine, and Georges Sand; and for a short time with the Saint Simonians. In 1834 began his *liaison* with the Comtesse d'Agoult, who bore him three children, one of them becoming the wife of Emile Olivier, the French statesman, and another the wife of Richard Wagner, the composer. The transcendent ability of Liszt as a pianist forced him almost against his will into a long series of tours in practically all the countries in Europe from 1839 to 1847. England was fortunately visited three times in this period. According to all competent judges such pianoforte playing was never heard before nor since. His personal fascination was very great, his liberality princely. In 1849 Liszt settled at Weimar and remained there eleven years directing the opera. He threw himself ardently into the aims of the new school, Wagner found a hearing, and Weimar became the focus for the "Missions of the Future," as they absurdly styled themselves. In 1859 Liszt left his official position at Weimar, where a spirit of opposition to his incessant activity and progress had grown up. Since then he has lived at Rome, Pesth, and Weimar, usually surrounded by a group of eager students and admirers.

Liszt's compositions are numerous and very various. His transcriptions of songs and orchestral pieces for the pianoforte are admired by every one as *chef-d'œuvre* in their style. His orchestral works comprise a Faust symphony, a Dante symphony, and several symphonic poems (Mazeppa being perhaps the best one), and Hungarian Rhapsodies, enthusiastically admired by some, but many of them denounced as quite unintelligible by others. He has written also some masses, an oratorio ("Christus") and a sacred cantata ("St. Elizabeth"), besides many songs and part-songs. Liszt has also been a vigorous advocate of new musical ideas on paper, producing criticisms, translations, and biographies to a considerable amount.

LIT'ANY (Gr. *litania*, a supplication), a form of solemn supplicatory prayer sung or said by priest and choir, or priest and people, in alternate invocation and response. The Litany in use in the Church of England was sung in Latin certainly as early as 450 (at Vienne in France), and our translation (a free version of the *Litanie Majores*) was published by Cramer without musical notes, in May, 1544, five years before the appearance of Edward VI.'s prayer-book. In June a musical setting was published with the English translation, the music being that of the ancient plain-song setting of the Roman Church. As Marbecke omits the Litany from his "Common Prayer noted," it is likely that Cramer himself arranged this music. Day harmonized it very beautifully—the melody is the tenor, as usual; but all other settings pale before the

exquisite setting of Tallis, which is now always used when, by good fortune, modern tunes to the venerable responses are not substituted for those which have existed for so many ages.

Although the English Church uses but one litany (though that is really, as the responses show, a fourfold prayer), the Roman Catholic Church has several such forms in use. The "Litany of the Saints" is the most usual and the most ancient. The "Litany of Our Lady of Loretto" was used in pilgrimages to Loretto in the thirteenth century, and is frequently sung in processions, expositions of the sacrament, &c. The "Litany of the Name of Jesus" is another form much in use.

LI TCHI or LEE-CHEE, the produce of the *Nephelium Litchi* (order SAPINDACEÆ), a native of South China. The fruit is about the size of a filbert, of a red or green colour, with a thin tough rind and a colourless pulp, in the centre of which is a single seed. The pulp is rather sweet, and very pleasing to the palate. The Chinese dry the fruit and esteem it a great luxury; much of it has been sent to the United Kingdom during the last few years. In the dried fruit the pulp shrivels and becomes blackish in colour. (It is sometimes called *Ly-chee* by the fruiterers.)

LITHIC ACID DIATHESIS. See URINE, MORBID CONDITIONS OF.

LITHIUM. This metal is widely diffused, but in very minute quantities. It is found in several rare minerals: in petalite, in which it was first discovered by Arfvedson in 1817; and in amblygonite, apyrite, and lepidolite, also in quantity in a mineral spring in Cornwall. Sea-water, tobacco, and several mineral waters contain traces of it. The pure metal was first obtained by Bunsen from the chloride by electrolysis. It has a brilliant lustre resembling silver when freshly cut, but it quickly tarnishes. It is a soft metal, rather harder than sodium, and may be drawn into wire. It melts at 180° C. (356° Fahr.) The specific gravity is 0.582. It is the lightest solid body known. The atomic weight is 7; symbol, Li. It rapidly oxidizes in the presence of water. It burns with an intense white light, and with oxygen gas, also in chlorine and carbonic acid. Bromine, iodine, and nitric acid act on it with great violence. The principal oxide is lithia (Li₂O), a white powder. The hydrate (LiHO) is crystalline. It is a strong alkali resembling potash hydrate, but is less soluble in water. It melts below a red heat, forming a crystalline mass on cooling, and resembling fused potash, but it is less volatile at higher temperatures. It has a powerful corrosive action on platinum, and must therefore be fused in silver vessels. The chloride of lithium (LiCl) crystallizes in cubes resembling potassium chloride, but it is more volatile. The hydrated chloride (LiCH₂O) crystallizes in rectangular prisms. Both are deliquescent. The bromide of lithium (LiBr), a deliquescent white salt, is used in medicine as a hypnotic, and in epilepsy. Citrate of lithium (Li₃C₆H₅O₇) and carbonate of lithium (Li₂CO₃) are also much used in medicine in gouty affections; the latter is usually taken in the form of lithia water, in which the alkali exists in the form of bicarbonate. The lithia combines with the uric acid so characteristic of the urine of gouty patients, and forms urate of lithia, which is a very soluble salt, and is easily passed off in the urine. Lithium is distinguished by the magnificent crimson tinge which all its salts impart to flame. Very minute traces may be detected by the spectro-scope; the principal line is a brilliant crimson. This test is so sensitive that the ash of a cigar shows the presence of lithium at once.

LITHO-FRACTEUR. Among other incidental operations which were carried on before Paris by the Prussian engineering corps after the forts were taken in 1871, was that of breaking up a number of French heavy guns, or at least of blowing off their muzzles. These operations were effected with an explosive compound of which little or

nothing had previously been known or heard. This substance was litho-fracteur, which, so far as present experiments have proved, is one of the most violent, and at the same time safe and useful, explosive compounds yet discovered. Litho-fracteur—literally "stone-breaker"—is the invention of Professor Engels, of Cologne, and there is a great demand for it throughout Germany and Austria for mining purposes. It contains, like dynamite, 75 per cent. of nitro-glycerine, differing from that compound, which contains 25 per cent. of fine sand, in having the nitro-glycerine taken up and rendered innocuous by admixture with other substances of great explosive power, and with a smaller quantity of infusorial earth. These are blended together into a stiff white paste, which burns with a white ash. The compound is made up into cartridges by wrapping it in thin paper (each cartridge containing 1½ oz. of the material), and it is rapidly coming into use for the special purposes for which it is adapted. It can only be exploded by a percussion cap, and is little affected by water, a matter of great importance where mines are situated in wet ground and for torpedoes.

LITHOGRAPHY (Gr. *lithos*, a stone; *graphê*, a writing or graving) is the art of producing a drawing or writing on stone, and of subsequently multiplying copies of the drawing or writing by printing impressions off the stone. It was invented by Aloys Senefelder, of Munich, about the end of the eighteenth century.

Lithographic stone is simply a variety of limestone varying in colour from buff to gray. The best stones are obtained from Solenhofen, near Munich, and from Papenheim, on the banks of the Danube. They have also been found in various other parts of the globe, but none successfully rival the German ones. Zinc has been used as a substitute for the stone, but the natural oxidation of the metal constitutes a serious obstacle to its success.

Lithography is based on the mutual antipathy of oil and water. The stone is of a slightly porous nature, the drawing is executed on it with a species of greasy ink, which is absorbed by the stone, and the printing ink with which the impressions are produced is also of a greasy nature. This printing ink is applied to the stone by means of a roller, but previous to this a damp cloth is passed over the stone so that the whole surface becomes damp, except where there are lines produced by the greasy drawing ink, which repels the damp. The roller is then passed over the stone, but the printing ink with which it is charged is repelled by the damp, and is only able to adhere to the lines of the drawing; a sheet of paper is then pressed against the surface of the stone, and the printing ink (with which the drawing has been charged by the roller) adheres to the paper, which thus receives an exact facsimile of the drawing on the stone. The stone is again damped, the inking roller is again passed over it, a second sheet is pressed on it with the same result, and so on until the desired number of facsimiles has been obtained.

Lithography is a twofold art:—(1) that of the artist. (2) that of the printer. It is the duty of the artist to execute the drawing, and then the printer has to multiply copies of it by printing. The artist executes the drawing either with a fluid and oily ink, which he applies to the stone with a brush or pen, or with a dry but greasy chalk. Of course both the ink and the chalk are black, so that the artist may see what he is doing, but it must be distinctly understood that his object is simply to produce on the stone *greasy marks* which will repel the damp and attract the printing ink.

There are two other methods which are used when it is desired to produce very fine lines or delicate but firm drawing. (1) The picture (or writing) is engraved on the stone with a very sharp tool, and then grease is rubbed into the fine lines thus produced; or (2) the picture is first engraved on copper, and then a print is taken off the

copper in a peculiar greasy ink on a piece of paper called *transfer paper*, which has been previously surfaced with a composition of flour, plaster of Paris, and gelatine. This print is then damped and pressed on the stone, and when the paper is lifted off the artificial surface adheres to the stone, and the greasy ink (called *transfer ink*) sinks into the stone: the artificial surface of the paper is then washed off the stone, and the transfer ink is found to have produced delicate lines on the stone, which will repel water and attract printing ink. This process is called *transferring*, and is a very common one. In the same way impressions are very often taken off one lithographic stone and transferred to another, or they are taken off type and transferred to the stone. Artists also frequently execute their drawings on transfer paper, and the drawing is subsequently transferred to the stone from which it is to be printed.

The fluid ink which is used in drawing on the stone with pen or brush is composed of shellac, tallow, wax, soap, and Paris black, while the dry chalk used for chalk drawings is chiefly composed of wax and soap with a good deal of black, and is hardened by burning. Lithographic printing ink is composed of two main constituents:—(1) the medium or varnish, (2) the colouring matter. The varnish is made by burning linseed oil, or by blowing air through it at a high temperature until a certain amount of oxygen has combined with the oil, and to this is added some dry substance to give the ink the colour required: for black ink this is usually lamp or Paris black, while many different substances are used for producing the primary and compound colours, varying in value from red lead at 1s. per lb., to cadmium at 35s., cobalt at 50s., and carmine at 60s. per lb.

After the drawing or transfer, called the "job," has been put on the stone, it has to go through a chemical process as a preparation for printing. The surface of the stone is coated with gum. The gum is then washed off, the stone damped, the job charged with printing ink by means of a roller, and the surface of the stone is then washed over with a weak solution of nitric acid, gum, and water (etching); this solution is then washed off, and the stone is again coated with gum and allowed to dry. The object of this process is to aid the damp to make the stone as impervious to grease as possible, and if it were omitted it would be found that in the process of printing the stone (in spite of being damped) would gradually become greasy all over, so that the printing ink would adhere to parts of the stone where there was no drawing, and the whole of the print would look blotted and blurred.

Lithographic printing is done either on a hand-press or on a steam machine. In the hand-press the impression is given by means of a strip of boxwood, which is called a scraper, and hence the press is sometimes called a scraper press. The stone on which the drawing (or "job") has been executed is laid on a carriage or bed; it is then damped, the job is charged with ink, and a sheet of paper is laid on it; then by turning a handle the carriage is caused to pass under the scraper, which presses the paper firmly on the face of the stone, thus causing the ink with which the job has been charged to adhere to the paper, so that when the paper is lifted off the stone it lifts the ink with it, and thus bears a facsimile or impression of the drawing or writing. This process is slow and expensive, so lithographic printing is now generally done by steam machines. In the machine the stone is laid on a carriage or bed as before, but this carriage is caused to run to and fro by steam-power, so that the stone passes under one set of rollers which damp it, another set which charge the job with ink, and finally it passes under a large cylinder, on the surface of which is placed the sheet of paper which is to be printed; as the stone passes under the cylinder the latter revolves, pressing the paper on the stone so that the paper receives the desired impression of the drawing.

While this sheet is being lifted off by one boy, another places a fresh sheet, and the carriage meanwhile runs along under the two sets of rollers for the stone to get damped and inked; the process thus goes on without interruption.

Chromo-lithography is the art of executing lithographs with *coloured* ink, and is a complicated, difficult, and costly process. The different colours are put on, each in a separate printing; so if a chromo is to get (say) fifteen different washes of colour or "printings" (no unusual number), each sheet has to pass through the machine or press fifteen times, and each colour must fall into its place or "register" with the greatest exactness. The colour-printer has many other difficulties to contend with: some of the brightest pigments, such as carmine or ultramarine, are most troublesome to work, they are so liable to be affected by the damp on the stone; others (especially aniline colours), although they make an attractive and very transparent ink and yield a brilliant impression, are so fleeting that when the print is exposed to the light they rapidly fade and become poor and dull, so that the whole appearance of the print is changed. Other inks again, such as the chromes or vermilion, although excellent in many respects, are so opaque that they almost extinguish any colour above which they are printed. And last of all, the printer has to bear in mind that the appearance of the earlier printings is totally changed by the juxtaposition of some of the colours which are printed later on. Thus when at the outset a warm flesh colour has been printed on a figure, its ultimate appearance may be changed to a sickly yellow by the contrast of a deep red which may be subsequently printed on the draperies.

The above is a rough outline of the general principles and process of lithography as regards drawing, transferring, etching, and printing. Of course there are many variations of the process and materials used, which are adopted by experts to suit special cases or special ends they may have in view; but it is unnecessary to trouble the general reader with these technical details. Those who wish a more thorough knowledge of the art should consult Richmond's "Grammar of Lithography" (Wynan & Sons, 1879), a most exhaustive and masterly work.

LITHOLOGY (Gr. *lithos*, a stone, and *logos*, a discourse) is the study of the minute structure, constituents, and composition of stones and rocks. Lithology is conducted chiefly indoors on hand specimens, its object being to determine whether the specimen is crystalline or non-crystalline, whether it is homogeneous or an aggregation of material, to recognise the individual minerals which compose it, and to investigate its ultimate chemical composition. In lithology three methods of examination are adopted—the *macroscopic*, which considers the characters readily perceptible to the naked eye; *microscopic*, which examines into those minute features in structure and composition perceptible only under a high magnifying power, and usually applied to thin sections of the rock specially prepared; *chemical* examination investigates the ultimate composition of rocks, but it is of limited application in geology, as rocks are classified more upon their mineral constitution and mode of origin than upon their chemical composition.

As lithology deals only with hand specimens it takes no account of rock masses in the field, nor of the structures as seen impressed on them there; these are treated of in the branch **PETROLOGY**.

LITHOMARGE is typically an indurated kaolin, with a hardness of about 2, and of various colours, but often mottled. The colouring matter is usually an oxide or hydrated oxide of iron. It is somewhat unctuous to the touch and adheres to the tongue.

Among the Tertiary basalts of Antium, beneath the iron-ore measures, there is a considerable thickness of a rock called lithomarge. It varies greatly in colour, being liver-coloured, mottled, brown, yellow, or red, and the

upper portion is sometimes worked as an iron ore. It is evidently an altered form of certain of the basaltic flows, and in it are often found lenticular patches of bauxite.

LITHONTRIPTICS (Gr. *lithos*, a stone; and *tribo*, I wear out) are medicines designed to dissolve a stone or calculus in the urinary organs. There are many remedies which at different times have enjoyed a high reputation as solvents for stone, and the secret of one of these was purchased by Parliament in 1739 for £5000. It turned out to be chiefly a combination of lime water and soap, and though its use sometimes afforded relief it had no power to procure the dispersion of a stone once formed. Many attempts have been made to discover a medicine which, when taken internally or injected into the bladder, should have the power of acting as solvents, but up to the present these efforts have not been attended with any great amount of success. The most useful, and certainly the most harmless, lithontriptic known is distilled water, which, when taken in large quantities, tends to soften and partially dissolve small calculi, and to enable them to be ejected through the natural passages. Where the calculus is formed of uric acid, potash and lithia waters may be taken with advantage, and in the case of phosphatic calculi acid remedies are used instead of alkaline. As acids when taken by the mouth are very apt to derange the digestion, they are usually administered by injection, and their use in this manner has in some cases been attended with much success. As the researches of modern chemists and pathologists have given something approaching to a scientific explanation of the circumstances under which calculi form, as well as of their varied characters, it may reasonably be expected that more good will in future result from the use of lithontriptics than hitherto.

LITHOTOMY (Gr. *lithos*, a stone; and *temno*, to cut). Although urinary calculi may be extracted from the kidneys, urethra, or bladder, the term lithotomy is restricted to the operation of cutting into this latter viscus for the purpose of removing one or more stones. Before the operation is performed it is necessary to determine with certainty the presence of a stone, which is done by *sounding* the patient. This consists in introducing into the bladder, through the urethra, a metallic instrument called a sound, by means of which the stone can be plainly felt, and an audible noise perceived on striking it; till this be rendered evident, no surgeon would be justified in undertaking the operation.

Several modes of performing lithotomy have been in use, but that which is mostly had recourse to at the present day is the *lateral operation*—so called from the prostate gland and neck of the bladder being cut laterally, in order to avoid wounding the rectum. The patient having been put under the influence of chloroform and then sounded, to ascertain that the stone is actually within the bladder (for instances have occurred of stone becoming encysted a short period before the operation), he is placed on his back upon a table, with his buttocks projecting rather beyond its edge; he is then made to grasp the outside of each foot with the hand of the same side, and the two pair are firmly bound together. A *staff*, which is an instrument shaped very much like a catheter, or sound, but somewhat longer, and grooved on its convex side, is passed through the urethra into the bladder, where it must be retained firmly by an assistant, its convexity looking towards the perineum, and the groove slightly inclined to the left side of the patient. The operator now commences his incision below the bulb of the urethra, about an inch and a quarter in front of the anus, and continues it obliquely downwards to the left of the raphe of the perineum for 3 inches, till it reaches midway between the tuberosity of the ischium and the anus; this should cut through the integuments and superficial fascia. The next incision, made in the same direction, divides the

transversus perinei muscle, and exposes the membranous portion of the urethra, and the groove in the staff must be felt for with the finger; into this groove, which serves as a director for making the concluding section of the operation, is inserted the point of the knife, which is then pushed along the groove in the staff till it enters the bladder. The surgeon then introduces his left forefinger to ascertain that the wound is sufficiently extensive to permit the extraction of the stone; and if it be not, he either repeats the last incision, or dilates the opening in the bladder with his finger. The staff is now to be withdrawn, and the forceps carefully introduced, and the stone seized and removed.

Another form of staff, called the rectangular, was introduced by Professor A. Buchanan of Glasgow, which necessitates only *one* incision; the operator at once entering the groove in the staff, and, without removing the knife, pushing it into the bladder by a straight thrust. This operation is very easily performed, and has been attended with very great success. The writer has performed it nineteen times with only *one* fatal result.

LITHOTRITY (Gr. *lithos*, a stone, and the root *tri*, to pierce), **LITHOTRIPSY** (Gr. *lithos*, and *tribo*, to break up), the reduction of a calculus in the bladder into small pieces, by means of instruments passed into it through the urethra, so that the fragments may be discharged through the latter tube. This operation must be ranked among the most brilliant achievements of modern surgery, as it proposes to substitute a nearly perfectly safe proceeding for the more serious and dangerous operation of lithotomy. It, however, can only be performed with certainty of success in the adult, and on calculi of a comparatively small size. The lithotrite is an instrument consisting of a smooth hollow steel rod 15 inches in length, with its extremity about $1\frac{1}{2}$ inches bent at nearly a right angle. Along this rod glides another, its extremity bent the same as the first, in such a manner that its bent end is received into a groove in the bent end of the first. When shut up, the two rods seem one instrument, but when introduced into the bladder the inner one can be withdrawn—as when one opens a pair of forceps—so as to leave an interval between the bent ends, into which the stone falls or is caught, and by a rack and pinion the bent ends are driven together, and the stone crushed to pieces. Great care is necessary in the employment of instruments in such a delicate organ as the bladder.

The best instrument for the purpose is one the peculiarities of which are the invention of Sir Henry Thompson, who attained an ability as near perfection as possible in the performance of this difficult operation. The success, however, is not invariable, but depends greatly upon the strength of the patient's constitution and the extent which the disease may have assumed. Notwithstanding the utmost skill of Sir Henry Thompson, the ex-Emperor Napoleon sank under this operation at Chislehurst, in 1873.

LITHUANIA, a large tract of country in the north of Europe, which now forms the Russian provinces of VILNA, GRODNO, BIALYSTOK, MINSK, MOHILEV, and VITEPSK, with the palatinate of Augustov, in the kingdom of Poland.

The *Lithuanian language*, or *Lettish*, is one of the chief tongues of the Slavo-Lettic branch of the Indo-European (or Aryan) family of languages, to the Teutonic branch of which English belongs. It is widely different from the Teutonic tongues, however, and even from the Slavonic speech, with which it is usually bracketed. It has three main dialects, the Old Prussian (extinct since 1650), the Lithuanian, and the Livonian, all clustered round the great bend of the Baltic. The Lithuanian is the most important and the oldest, having records from the middle of the sixteenth century. It exhibits in some respects a remarkable conservation of ancient material and form. It is, however,

to the Livonian tongue that the term Lettish, when limited to one speech, is applied.

LITMUS, a blue colouring matter obtained from *Rocella tinctoria* and other lichens by fermentation in the presence of carbonate of potash; it occurs in commerce in the form of small cakes, being made into a mass with chalk. It contains four separate colouring principles, azolitmin (blue), spaniolitmin (light red), erythrolein (red), and erythrolitmin (deep red). Litmus is used principally in the laboratory as an indicator of saturation of acids or alkalies, the former turning its solution red, the latter blue. It is also used in the form of test paper for the same purpose.

LITRE, the French standard measure of capacity in the metrical system. It is a cubic decimetre, or a cube whose sides are each 3·9371 English inches. It contains a little less than our quart; more precisely, it is ·22009637 of a gallon. The litre is subdivided into decilitre, centilitre, and millilitre, or the tenth, hundredth, and thousandth part of a litre. Ten litres make a decalitre, 100 a hectolitre, 1000 a kilolitre. The hectolitre is equal to ·3439009 of an English quarter, or nearly 2½ bushels, and is the common French measure for grain.

LITTLE ROCK, a town of the United States, the capital of Arkansas, situated on the right bank of the Arkansas River, about 300 miles from its mouth, and 1065 miles W. by S. of Washington. It is situated on a rocky promontory or bluff about 50 feet high, the first that occurs in ascending the river, commanding a delightful and extensive view of the surrounding country. The town contains a State House, a United States arsenal, the State Penitentiary, which has been once or twice burnt down by the convicts, and several churches. Little Rock communicates regularly by steamboats with different points on the Arkansas and Mississippi Rivers. Its chief industries are flour-mills, carriage works, and foundries. There are fine granite and slate quarries in the vicinity. It is the seat of the government and of the legislature. The population in 1880 was 13,138.

LITTLEHAMPTON, a maritime town and watering-place of England, in the county of Sussex, 18 miles W. of Brighton, 4 miles S. of Arundel, and 62 from London by the South Coast Railway. The harbour is formed by the influx of the Arun into the English Channel, is defended by a fort, and is accessible to vessels of considerable burden. Extensive waterworks have been constructed, which yield an abundant supply. Considerable quantities of wine and brandy from France are imported. The town is much frequented for bathing in the summer, and there is good accommodation for visitors. The population of the town and parish in 1881 was 3926.

LITTLETON, SIR THOMAS DE, a famous English lawyer, was the eldest son of Thomas Westcote, of the county of Devon. The year of his birth is unknown, but after he had been educated at one of the universities he removed to the Inner Temple, where in due time he became one of the readers. On the 26th April, 1466, he was appointed one of the judges of the Court of Common Pleas, and went the Northamptonshire Circuit. In 1475 he was created a knight of the Bath. He died at Frankley on the 23rd August, 1481, aged about sixty, and was buried in Worcester Cathedral.

Littleton's work on English Tenures is written in Norman French, divided into three books, and addressed to his son. The style of this treatise is very good. It combines the qualities of cleanness, plainness, and brevity, in a degree that is extraordinary for the rude age in which the author wrote. It is much better for the student who wishes to lay well the foundation of his professional knowledge to read Littleton first without the comments of Coke, which he will find useful afterwards, when he wishes to examine any particular point very minutely. With Coke's Commentary it enjoyed for a long period the first place

among legal text-books having reference to the laws relative to property, but the many changes of modern times have greatly diminished its value, and it is now but little studied by lawyers.

LITRÉ, PAUL MAXIMILIEN ÉMILE, an illustrious French scholar and philologist, was born at Paris, 1st February, 1801. He was educated at the Lycée Louis le Grand, where he had for friends Hachette, Burnouf, Bascon, and others afterwards illustrious as scholars, and where he combined extraordinary success in learning with a first place in all the athletic exercises of the school. After leaving school he studied medicine and botany for eight years with a view of becoming a doctor, but after passing all his examinations, the death of his father in 1827 caused the support of his mother to devolve upon him, and he was unable to obtain his degree. For the next two years he supported himself and his mother by giving lessons in Greek and the modern languages, and by occasional contributions to the press, and when the revolution of February, 1830, broke out he shouldered a musket in defence of the popular side. In 1831 he obtained an introduction to Armand Carrel, the editor of the *National*, who employed him at first as translator, but after discovering his ability placed him upon the regular staff. From that time he became a constant contributor, and helped greatly to raise the paper to the high position it held for so many years. He also contributed numberless articles to the *Revue des Deux Mondes* and all the leading periodicals, and in 1839 published the first volume of an edition of Hippocrates, with a version in French, the tenth and last volume of which appeared in 1861. About this time he became acquainted with the writings of Auguste Comte, and soon forming an intimate friendship with that philosopher, became an earnest advocate of his system. He took a keen interest in the revolution of 1848, and published a series of important essays in the *National*, which he afterwards collected and issued in 1852 under the title of "Conservation, Révolution et Positivisme." He was unable to follow Comte in the development of the mystical doctrines which marked the closing years of his life, and after the death of Comte in 1858 Littré published his own ideas upon Positivism under the title of "Paroles de la Philosophie Positive." He published a larger and more complete work upon the same subject in 1863, entitled "Auguste Comte et la Philosophie Positive." In 1863 he set to work on the great undertaking of his life, the preparation of a dictionary of the French language, comprising, in addition to the information usually given in such works, examples of the several meanings of the words with exact reference to the classical works from which they are taken, a full discussion of all questions of grammar and lexicology, and such a body of details in reference to the arts and sciences, and to history, as to make the whole a kind of encyclopædia of exact information as well as a dictionary. Assisted by an able body of coadjutors, and working sixteen hours a day, he saw the completion of the work in 1873, and was gratified to find it received everywhere as the greatest work of the kind that had ever been published.

At the downfall of the empire Gambetta offered Littré the chair of History in the Ecole Polytechnique, and in 1871 he was elected a member of the Académie Française. In 1871 he was elected a life-senator. He died 2nd June, 1881. Until the close of his life Littré was an avowed materialist, but as he drew near the end he yielded to the influence of his wife and daughter, who were fervent Catholics, and was baptized and admitted to the Roman Catholic Church. M. Littré was beyond question one of the most learned men of his age, and one of the finest examples of advanced Liberalism. As a lexicographer he is unrivalled, and the French dictionary he compiled is undoubtedly the best lexicon of any living language.

LITURGY, a term generally used to denote any or all of the services of the Christian Church, but which is technically used to denote the form, order, or office for the celebration of the Eucharist. The use of a regular form of service in connection with this sacrament dates from apostolic times, as may be learned from the Pauline epistles, but it is also evident that the earliest forms were of a very simple kind. According to an old tradition, "the apostles used the Lord's Prayer only in consecrating the Holy Oblation;" but, however this may be, the use of a more elaborate ritual can be traced to the first centuries of the Christian era. As each bishop had full authority to settle the ritual of his diocese, different forms of service were adopted in different places, and in consequence there are a large number of different liturgies known to ecclesiastical scholars. According to some authorities there were composed at a very early period separate forms for the use of the churches of Jerusalem, Alexandria, Rome, and Ephesus, which were called after the names of St. James, St. Mark, St. Peter, and St. John respectively, and it is from these that all the later forms have been derived. From the first of these the Greek liturgies of St. Basil and St. Chrysostom, the Armenian liturgy of St. Gregory the Illuminator, and numerous Syriac liturgies have been derived. At the present day the liturgy of St. Chrysostom is chiefly used in the orthodox Eastern Church, though at certain seasons this church employs the liturgy of St. Basil and the liturgy of the presbyter. From the second is derived the liturgy used by the Coptic Church of Egypt, with several Greek and a number of other number of Ethiopic liturgies. From the third is derived the Ambrosian liturgy, which is used in the diocese of Milan, and especially in its great cathedral, and the present liturgy of the Roman Catholic Church. From the fourth is derived the celebrated Mozarabic liturgy which formed the national liturgy of the Spanish Church until the close of the eleventh century, but which is now only used in two churches in Spain; the Galilean liturgy, which was the ancient national liturgy of France until the beginning of the nineteenth century; possibly the liturgies used by the ancient Celtic Church of Great Britain, and more certainly the liturgy introduced into England by the Normans. It must be mentioned, however, that much controversy has been maintained among ecclesiastical scholars concerning the history of the ancient liturgies, and some assign a different origin to that we have mentioned for each of the liturgies enumerated. Previous to the Reformation of the Church of England the service was performed in Latin, and different liturgies were used in different parts of the kingdom. The cathedrals of York, Lincoln, Hereford, and Bangor, and even Aberdeen in Scotland, had their respective uses; but no cathedral had such a variety of service books for its use as Sarum. At the Reformation all the Protestant churches adopted liturgies, or, more correctly, prayer-books. In England the publication of King Henry VIII.'s "Primer" in 1535, in the vernacular tongue, was one of the first steps in the reformation of doctrine and worship in the Church of England. In 1547 Archbishop Crammer, Bishop Ridley, with eleven other bishops and eminent divines, were commissioned by the king (Edward VI.) in council to compile a prayer-book in the English language, which was confirmed by Parliament in 1548, and published in 1549. In 1561 it was revised and again confirmed by Parliament. Both Acts were repealed in the first year of the reign of Queen Mary; but upon the accession of Elizabeth, several learned divines, headed by Archbishop Parker, were appointed to make another review of King Edward's prayer-books, when a modified form of the second book of King Edward VI. was determined upon, and finally confirmed by Parliament. The Act received the royal assent 29th April, 1559. In the last year of James I., after the conference

at Hampton Court, a few slight alterations were introduced. In this state it continued till the time of Charles II., who, in 1661, issued a commission to empower twelve bishops and as many Presbyterian divines to consider the objections raised against the Prayer-book, and to make such reasonable and necessary alterations as they should jointly agree upon, nine assistants on each side being added to supply the place of any of the twelve principals who should happen to be absent. The conference broke up without anything being done, except that some particular alterations were proposed by the episcopal divines, which in the May following were considered and agreed to by the whole clergy in convocation. The Prayer-book was then brought to its present condition, and was unanimously subscribed by both Houses of Convocation of both provinces on Friday, 20th of December, 1661, and being brought before Parliament the March following, both houses passed an Act for its establishment; and the Earl of Clarendon, then lord chancellor, was ordered to return the thanks of the lords to the bishops and clergy for the great care and industry shown in its revision. No important alteration has been made since in the Book of Common Prayer so far as England is concerned, but after the disestablishment of the Irish Church several changes were introduced into it at a synod held in Dublin in 1870. These changes included the excision of all lessons from the Apocrypha, of the rubric ordering the recitation of the Athanasian Creed, and the form of absolution in the office for the visitation of the sick. On the Continent most of the Reformed Churches have liturgies which they have drawn up for their own use.

LIVER. The liver is an organ the exclusive duty of which, until recently, was stated to be to secrete bile; but the secretion of sugar for combustion in the lungs or capillaries is now known by the researches of Claude Bernard to be one of its chief functions. [See GLYCOGEN.] The liver also acts as a great blood-elaborating gland; for peptones, if injected into the jugular vein, so as to escape the liver, are passed off (in the urine, &c.) practically unaltered, but if introduced into the portal vein and allowed to pass through the liver they are readily assimilated. It is evident, therefore, that the liver assists assimilation, though the exact manner of this is not yet clear. A still more important function is that of purifying the blood, by means of the bile, which serves not only for digestive, but also for excretory purposes. Many things may be taken up in digestion unfit for nutrition, or perhaps absolutely poisonous. The liver stands directly in the path of the circulation at its outset, and all such matters have to pass its guard. The frequency with which the liver excretes metallic poisons or retains them in its own substance shows its beneficent power thus to intercept elements noxious to the organism. Parts supposed to have an analogous function have been found in insects, but their nature is at present a disputed question. The differences in regard to size, form, and colour, which the liver presents in the higher animals, are of no great importance.

In man the liver is a large solid viscus, of a reddish-brown or mottled red and yellow colour, situated immediately beneath the diaphragm, in the right hypochondriac, and partly in the epigastric region of the abdomen. [See ABDOMEN.] When enlarged it can be felt by the hand applied below the ribs on the right side. It is flattened in the vertical direction, is thinner at its anterior than at its posterior border; and its outline, when viewed from above, is irregularly ovoid. The upper surface, which is convex, is applied to the diaphragm; the lower, which is irregularly concave, lies above, and in contact with the stomach, large intestine, and right kidney, has attached to it the gall-bladder, and presents two deep furrows, which divide it into several compartments, termed by anatomists lobes. Of the furrows, one running from before backwards (the longitudinal fissure), transmitted, during uterine life, the

vessel which conveyed the blood from the placenta to the heart of the fœtus; it afterwards contains merely the cord-like remains of that vessel, now impervious in the greater part of its extent. The second furrow, in the under surface of the liver, is called the transverse fissure, since it crosses the former at right angles, lying, however, chiefly to its right side; it serves to allow the entrance of blood-vessels and nerves to the liver and the exit of the bile-ducts. Like other viscera of the abdomen, the liver receives an investment from the lining membrane of that cavity, the peritoneum, which being reflected from it at different points, forms broad bands connecting the liver with surrounding parts.

The intimate structure of the liver consists of ramifications of the hepatic artery and vein, the portal vein, and the hepatic ducts. The ultimate arrangement of these different bloodvessels in the liver is very peculiar. When the substance of the liver is torn, it is seen to be composed of innumerable granules of about the size of a pin's head; each of these contains the elements of a liver. They are connected most intimately with the branches of the hepatic vein, a small twig of which is contained in the interior of each, while on their exterior surface and in their interstices run branches of the portal vein, hepatic artery, and bile-duct. The mass of each granule or lobule is constituted in great part of a close network of capillary bloodvessels, which communicate on the exterior with the small branches of the portal, and on the interior with the twig of the hepatic vein. The blood brought by the portal vein, therefore, is poured into the capillary network of each granule or lobule of the liver, and, after yielding in it the constituents of the bile, is received into the branches of the hepatic vein, whence it is transmitted to the general vascular system. The branches of the hepatic artery soon become very minute on the exterior of the lobules, and few can be traced into their interior; it is probable that, after having nourished the coats of the vessels and ducts, and other tissues of the liver, the blood of the hepatic artery is poured into the minute network formed by the ultimate division of the portal vein, and contributes with the blood of that vein, to yield the constituents of the bile.

The biliary canals, reduced in number by successive reunion to two tubes, one from the right, the other from the left lobe of the liver, issue at the transverse fissure of its under surface, there soon unite, and form one main trunk, the hepatic duct. After running a short distance together with the portal vein, hepatic artery, and nerves, in a quantity of dense cellular tissue inclosed within the fold of the peritoneum, the hepatic duct meets and unites with the duct of the gall-bladder, or cystic duct. The tube resulting from the junction of the hepatic with the cystic duct is called the *ductus communis choledochus*; it is about $3\frac{1}{2}$ inches in length, and terminates by opening, together with the duct of the pancreas, into the portion of the intestine named duodenum, at the distance of a few inches from the stomach.

The gall-bladder is a pyriform membranous sac, lodged in a shallow depression at the interior surface of the liver, which communicates, as we have stated, with the excretory duct of the liver, by means of a tube called the cystic duct. See BILE.

Diseases of the Liver.—The liver is subject to all those general morbid changes which, depending on disordered actions of the bloodvessels, modification of the nutritive process, or alterations in the blood itself, may affect most organized parts of the body; such are inflammation (hepatitis), acute and chronic, hypertrophy and atrophy, induration and softening, and the different kinds of tumours or transformations of tissue, carcinoma or cancer, medullary sarcoma, fungus hæmatodes, melanosis, and scrofulous tubercle. It is occasionally infested by parasitic animals (hydatids), which may likewise affect other parts.

But the liver is also liable to other diseases which appertain to it specially, and are connected with its function—secretion. The chemical changes which give rise to the formation of bile in the liver may be so deranged, that one or all of the ingredients of that fluid are increased or diminished in quantity, or vitiated in quality, and such disorder of the secreting process may manifest itself in several ways: the imperfectly formed fluid passing into the intestines may cause irritation there, and consequently diarrhœa; or, being absorbed into the blood, may produce jaundice and its concomitant symptoms; or some of the ingredients of the bile may concrete into solid masses in the ducts of the liver or the gall-bladder, forming gall-stones. The diseased state of the liver, in which it becomes impregnated with an unnatural quantity of fatty matter, may also be reckoned among the diseases appertaining to the special function of the organ, for the bile naturally contains a large proportion of fatty matter (cholesterine), though the chemical composition of this substance, and that of the oil or fat with which the liver is impregnated in disease, appears to be different.

LIVER ORE. See HEPATIC CINNABAR.

LIVER-FLUKE (*Fasciola hepatica*) is a parasitic flat worm belonging to the order TREMATODA. The liver-fluke is parasitic in the liver of sheep, producing the formidable disease known as rot. It is an unsegmented worm, with a flat, ovate body. The mouth is situated on a little lobe, and is suckorial. A little behind the mouth on the ventral surface in the middle line is a second large sucker, having no internal orifice. From the presence of these two suckers the liver-fluke was called *Distoma* (two-mouthed), but is now generally placed in the restricted genus *Fasciola*. The mouth leads into a pharynx, which can be protruded to a certain extent. After the pharynx the alimentary canal divides into two lateral caeca, which run down the body giving off numerous branches. There is neither intestine nor anus. On account of its completely parasitic habits the fluke has also no vascular system. The nervous system consists of two lateral cords, which meet just in front of the mouth to form a pair of cerebral ganglia. The skin is supplied with a network of nerves. The renal organs (nephridia) form a complete network throughout the body, and open by a single pore at the extreme end of the body on the ventral surface. The branches are ciliated and terminate in spaces of connective tissue. The extreme end of each branch is composed of what is called a flame-cell; this is a funnel-shaped body with the mouth of the funnel covered by a delicate membrane, which carries on its inner wall a large cilium which is always vibrating. The reproductive system is like that of all trematodes. The male and female organs are united in the same individual, and open by a single pore on the ventral surface between the two suckers.

The life-history of the liver-fluke is very wonderful and interesting; it was only fully known in 1881 through the researches of Mr. A. P. Thomas. When the diseased sheep dies, the eggs of the parasite escape, and from each is hatched a minute free-swimming embryo, about $\frac{1}{50}$ inch long, having an elongated conical body covered with very long cilia. At the anterior end of the body is a short retractile papilla, and a little below it two eyespots. It has long been known to farmers that the sheep in damp pastures were peculiarly liable to be affected with rot, but Mr. Thomas was the first to show what became of the eggs, and how the parasite found its way back into its host. He proved that for the development of the embryo it is necessary that it should pass its larval stages in a particular species of pond snail, *Limæus truncatulus*, which is very abundant in damp pastures. Having found its intermediate host the embryo begins to work its way into the snail's body. It spins round rapidly on its axis, the head papilla elongates and becomes pointed, the cilia work

vigorously, and the body is pressed against the surface of the snail, and gradually makes its way like a wedge into the pulmonary chamber, or more rarely into the body-cavity. Sometimes the embryo bores into the foot of its host, and then is unable to develop further and dies. If, however, it has got into the right region, it loses its cilia and the layer of cells which bore them, and grows rapidly, becoming sac-shaped. The inner cells of its body arrange themselves into seven or eight little balls. Each ball is composed of several cells and begins to develop into a new organism, which becomes oblong in shape, and has a blind digestive canal formed at one end. This organism, which is called *Redia*, has a delicate cuticle formed on its surface, and two short lateral processes grow out at the hinder end of its body. It breaks through the walls of the sporocyst (as the degenerated embryo is called), the hole thus made closing up, so that the other balls of cells can go on developing into *redie*. The *redia* now migrates into other parts of the snail's body, especially into the liver, on which it feeds by means of its suctorial mouth, and grows rapidly. Meanwhile balls of cells arrange themselves in the body of the *redia*, so that other organisms, called *Cercarie*, are formed within it. The *cercaria* has a somewhat spheroidal body, with a long vibratile tail; a ventral median sucker, suctorial mouth, planum, and forked alimentary canal are formed, and a pair of renal organs opening on each side of the tail. The *redia* when full-grown contains about twenty *cercarie* in different stages of development; they escape one by one, and the *redia* at last withers up. The sheep, when grazing, may devour a snail with the *cercaria* in its body. Usually, however, the *cercaria* escape from the snail, and encyst on blades of grass, losing their vibratile tails. In this encysted condition they may be taken up by the sheep as it grazes, in which case they develop into the mature sexual liver-flukes.

LIVERPOOL, a municipal and parliamentary city and seaport of Lancashire, stands on the right or east side of the estuary of the Mersey, in 53° 24' N. lat., and 2° 58' W. lon. Now one of the largest and most flourishing of the cities and seaports of the world, it was formerly a fishing village. It was one, and perhaps the largest, of the many pools or creeks on the sides of the river Mersey, hence its name. It is not mentioned in Domesday Book, having nothing taxable, its fisheries being free and its grazing-land, if any, included probably in Southdown or Lynton. Its name comes from our Saxon and Welsh ancestors, and was not altered by the incursions or encroachments of the Danes. As a town it owes its first growth to King John, who having enjoyed the pleasure of the chase for several years in the neighbourhood, acquired Liverpool by an exchange of manors, built several burghages, and promised to all his faithful tenants and liegemen the same privileges as other seaports enjoyed. The town prospered, and his son Henry gave it another charter, with definite liberties and a merchants' guild. This charter was confirmed by various kings, either with or without a clause of exclusive trading, until Charles I.'s reign, when the burgesses obtained a charter of incorporation, creating, or rather formally recognizing, that which had been in previous use—viz. a town council. This was followed by one from Charles II. with few alterations, but a more numerous town council. This again was given up to receive one from James II. After the Revolution, a return was made to the charter of Charles II., which was confirmed in 1692; but in 1695 another party, on a plea that its surrender had not been enrolled, succeeded in getting Charles I.'s charter restored, confirmed, and much enlarged by William III., which still continues to be the governing charter. In doing this, the old set of councillors were turned out *en masse*, which caused much bitterness. The corporation possesses a series of original charters and an unbroken record of their proceedings in about thirty volumes, in which the domestic

history of Liverpool lies enshrined, except so far as it has been extracted and published by Sir J. A. Pieton, in a recent volume.

In the reigns of Edward III. and Richard II. the burgesses were authorized to levy tolls to pave the town; and there were six of these royal *pavage* grants, which taxed merchandise, but were in force only for a few years each. In the reign of Elizabeth (1561), an improved harbour was constructed in the pool or arm of the sea which at that time ran along the south and east sides of the town, and with the river on the west made it almost an island. The Castle of Liverpool, a large quadrangular building, stood in the middle of the town, at the point where St. George's Church now stands, and the streets sloped down from it towards the river and the pool.

From the river Mersey the general aspect of the city and port is extremely fine, especially when lighted up at night. The rapid river, half a mile wide, the long line of docks, inclosing forests of masts, the large American liners and smaller vessels from every port, the ferry-boats in incessant motion, form a scene not soon forgotten. Geologically, Liverpool is upon the New Red Sandstone, which consists chiefly of red brown rock, varying in thickness to 200 feet. There is also a bed of fine yellow sand in the middle of the city, above which comes the rock, often overlapped with thick beds of clay. A few miles off the coal formation crops up, and collieries are within 6 miles of the city. Liverpool is extremely well suited for good drainage, and is very healthy and salubrious, the ceaseless tide ever bringing fresh ozone with health-giving breezes.

Liverpool formerly returned two members to the House of Commons. An additional member was granted to it in 1868, and by the Redistribution of Seats Act of 1885 it was divided into nine wards for parliamentary purposes, each returning one member. The municipal borough is divided into sixteen wards, and is governed by sixteen aldermen and forty-eight councillors.

Until the time of the colonization of the North American continent and the West India Islands by England, the trade of Liverpool only extended to the west coast of Scotland, to Wales, to the east and south coast of Ireland, and occasionally to France, Spain, and Portugal. The imports consisted of wool and linen yarn, which were in great demand, even in these early times, by the manufacturers of Manchester, and of wine and dried fruit from France and Spain. The exports consisted chiefly of Manchester goods, Sheffield cutlery, coals, and occasionally grain. During all this period Liverpool was a small place with only from 1000 to 1500 inhabitants; but there were then no great towns in the north of England, and Liverpool was as large as any of the neighbouring towns, except Chester, which was then the richest place in the north-western division of England.

But when new colonies were established in Virginia, New England, Barbadoes, and numerous other points on the mainland or on the islands of America, the commerce of the port began to expand, and at the close of the Civil War, in 1649, Liverpool had a considerable trade with America and the West Indies, as well as with other parts of the British Islands and the continent of Europe. The town, which actively supported the cause of the Parliament, suffered greatly in the Civil War, having been twice besieged—once by Prince Rupert, who carried it by storm, and a second time by Sir John Meldrum, one of the commanders of the Parliamentary army, who compelled the king's general, Sir Robert Byron, to surrender it to the Parliament. From the time of the Restoration to the Revolution of 1688, the commerce of Liverpool increased rapidly, and at the beginning of the eighteenth century nearly the whole of the Virginian tobacco trade, then the principal staple of America, was concentrated there. During the invasion of the Pretender in 1745, it raised a regiment for the king called the Liverpool Blues.

In the reign of Queen Anne the corporation of Liverpool obtained power to form a wet dock and a dock for the building and repairing of ships at the entrance of the pool. The first dock was opened 31st August, 1715, and the *Mulberry* was the first ship that entered. A second dock of larger size was formed in the reign of George II. A third and still larger dock was constructed immediately after the accession of George III. Two other large docks were constructed during the peace between the American War and the French Revolution, and before the close of the century the Liverpool docks, either formed or authorized to be formed, extended nearly 2 miles in length from north to south. During the present century, and especially within the last few years, they have been still more rapidly enlarged, so that they are now between 7 and 8 miles in length, independent of the immense docks which have been constructed at Birkenhead on the opposite side of the river Mersey. These docks, taken as a whole, now form the finest artificial harbour in the world and accommodate the greatest trade.

The most important public buildings in Liverpool are the Town-hall, the Exchange Buildings, St. George's Hall, the Municipal Offices, the banks, clubs, and the hotel at the entrance of the London and North-western Railway. The principal storey of the Town-hall contains a fine suite of rooms magnificently furnished, and approached by a noble staircase lighted from the dome. The saloon, two drawing-rooms, two ball-rooms, and the banquet-room, all communicating with each other, are noble apartments. The Exchange Buildings form, with the Town-hall, the sides of a quadrangular area which is used by the merchants of Liverpool as an exchange. The newsroom is one of the largest rooms ever erected for commercial purposes, being built to accommodate from 3000 to 4000 subscribers. The other buildings, designed for the underwriters of the port, with the Cotton Sale-room and other establishments, are also on a large scale. St. George's Hall is an exceedingly beautiful Grecian structure, the eastern façade of which is 400 feet long; it has a colonnade and projecting centre with depressed wings. Within the central projection is an ambulatory 26 feet wide; behind this is a noble vestibule or hall bounded on the north and south by the assize courts, to which it affords approaches. Equestrian statues of Queen Victoria and Prince Albert are in the front, with one of full length of Lord Beaconsfield in a standing posture, unveiled in 1882.

The building known as the Municipal Offices, opened in 1868, is a large quadrangular edifice, in the semi-classic style, and the principal front has an imposing appearance. The interior contains above 100 rooms, some of handsome proportions, which afford accommodation to the corporate and school-board officials. The Custom-house, in which are also contained the dock offices, the head post-office, and other public offices, is situated on the site of the old dock; the extreme length, measuring from east to west, is 466 feet. The Excise Office, the Stamp Office, a branch post-office, and the County-court Office are in Victoria Street.

The volunteers in Liverpool and environs have twelve companies—viz. six artillery, five rifles, and one engineers.

Liverpool contains upwards of ninety churches belonging to the Establishment; these, with the various episcopal and dissenting chapels, give a total of more than 250 places of worship.

The town of Liverpool was made a city and a bishopric formed in 1880. A cathedral is proposed to be built, and meanwhile St. Peter's Church is used as a pro-cathedral. There is also a Roman Catholic bishopric in Liverpool, which was founded in 1850.

The provision for education in Liverpool is of a wider and more complete character than is generally found in provincial cities, from the newly-founded University College which has recently been incorporated with the Victoria

University; the Liverpool College; St. Francis Xavier's and St. Edward's Colleges; the Liverpool Institute, with the newly-built School of Art; the Royal Institution School; Blackburne House, for girls; and many others. For elementary education in the city provision is made by fifty-two Church of England, twenty-four Roman Catholic, five Wesleyan, eleven British or undenominational, and twenty board schools, containing altogether accommodation for about 85,000 children, of which 20,000 is provided by the board schools. The School Board consists of fifteen members, who are elected for three years. Of the twenty board schools fifteen have been erected by the board, the remainder being acquired either by transfer or by lease. The number on the rolls of public elementary schools on the creation of the board was 47,590, with an average attendance of 31,252, and it has been increased by the exertions of that body to 82,000, with an average attendance of 67,000, of whom 18,000 are in board schools. The exertions of the board and of the managers of voluntary schools receive most valuable assistance from the labours of a voluntary association, entitled the Liverpool Council of Education, which has for its objects (1) the encouragement, by a graduated system of rewards, of regular attendance on the part of scholars in public elementary schools; (2) the discouragement of their frequent transfer from school to school; and (3) the promotion of the most promising boys and girls from the public elementary to the secondary schools of the city by means of scholarships, the distinguishing feature of which is that they provide for the recipient's maintenance as well as education during the period of their tenure.

Among the charitable institutions for education may be mentioned the Liverpool Blue coat Hospital, founded in 1708, which provides a good commercial education for 250 boys and 100 girls; and also the Liverpool St. James's Orphanage; the Orphan Asylums, for 100 boys, 180 girls, and 150 infants; the *Indefatigable* training-ship, for preparing the sons of sailors for the sea; besides four day industrial schools. There are also charitable schools for the blind, for the deaf and dumb, for male and female orphans. A large convalescent hospital was erected in 1873 at Woolton, from the surplus of the Liverpool contribution to the fund for relieving the distress caused by the cotton famine in 1862. A spacious hall for holding religious services, social gatherings, lectures, &c., was added to the original building by means of penny subscription from the working-classes of South-west Lancashire, and named the Gladstone Hall.

Numerous buildings devoted to charitable purposes have been erected in various parts of the town. The Royal Infirmary, the North and South Hospitals, the Workhouse, the Fever Hospital, the Lunatic Asylum, with the numerous smaller hospitals and dispensaries, are all most valuable and efficient establishments. The Stanley Hospital was erected in 1870-71. The new southern hospital, opened in 1872, provides 200 beds, and cost more than £30,000. There is also the Sailors' Home, near the Custom House, of which the first stone was laid by Prince Albert in 1846, which offers good accommodation to sailors on shore.

Foremost among the public institutions of the city stands the Free Library, Museum, and Art Gallery, a range of three contiguous buildings of various classical designs. In the first we find the public news-room, the free library, and the museum, which includes the Earl of Derby's collection, presented in 1851, and Mr. Mayer's, presented in 1867; in the next is the Pieton Reading-room for students and scholars, opened in 1879, and called after Sir J. A. Pieton in recognition of his eminent services to the city. It is a circular building, after the design of the reading-room at the British Museum. Underneath it is the Rotunda Lecture-hall, in which a series of free lectures is annually given to the public on various subjects, under the auspices of the library, museum, and arts committee. The third is the Art Gallery, erected

by the munificence of Sir A. B. Walker, and presented in 1877—all free to the public. In front of the Art Gallery are large statues of Raffaele and Michelangelo, by Warrington Wood. The same committee have also established branch libraries at the north and south ends of the city for lending out books to the inhabitants free of charge. In several of the board schools a reading-room, supplied with periodicals, is opened in the evening, also free.

In a line with these buildings the county magistrates have built a new sessions house, also in a classical style. The site selected for the new cathedral, St. John's Churchyard, is directly opposite the Free Library.

Under the late Improvement Acts several streets have been widened in the older parts of the city, and this has induced the erection of new offices, some of a palatial style, and shops of imposing exteriors. The new Conservative clubs, a new lying-in hospital, a new eye and ear hospital, new public offices in Victoria Street, and new workmen's dwellings in Nash Grove have much improved the appearance of the streets, and a terminus station of the Lancashire and Yorkshire Railway has much improved the neighbourhood north of Tithebarn Street.

Among the learned societies of Liverpool we may mention the Astronomical, the Architectural, the Geological, the Historic Society of Lancashire and Cheshire, the Literary and Philosophical, the Microscopical, the Philomathic, the Entomological, the Numismatic, and the Engineering Societies, the Naturalists' Field Club, science and art classes, and several others.

The principal places of public amusement are the Alexandra, the Prince of Wales, and the Court Theatre, the Philharmonic Hall, one of the noblest music-rooms in England, Hope Hall, and the Wellington Assembly Rooms. For a long time Liverpool was without a public park, but it is now being surrounded on the land side by a complete chain of them, viz. Sefton, Stanley, Newsham, Shiel, and Wavertree Parks. Sefton Park, on the south of the town, 375 acres in extent, opened in 1872 by the Duke of Connaught, then Prince Arthur, cost over £100,000. The corporation have also lately purchased the Kensington Artillery Grounds, about 50 acres not built upon. Numerous public baths, formed at the expense of the corporation, are much resorted to. One of them is close to the landing-stage.

The markets in Liverpool are on a very extensive scale. St. John's, which covers several acres, is open daily for the sale of meat, poultry, fruit, and garden vegetables.

No other town in Great Britain presents such a surprising increase in commercial prosperity as Liverpool. This is in a great measure owing to the impetus given to the cotton trade and the perfection of communication wrought by the "iron road," which made Liverpool the depot of all species of merchandise and manufactures intended for exportation to the United States. Nor must the enterprise of its inhabitants be forgotten, which still operates to increase the prosperity and maintain the commercial influence of the second city in the United Kingdom. At the beginning of the last century its population consisted of perhaps 5000 persons, and its shipping of about eighty vessels. In 1760 its population had increased to 25,780, and its vessels to 1245. The increase was still more rapid during the next forty years, for in 1800 it had 78,000 inhabitants, and about 5000 vessels entered and cleared annually. The great increase of the cotton trade was the cause of this wonderful improvement. In 1781 only 5,000,000 lbs. of raw cotton were imported; in 1791, 31,000,000 lbs.; and in 1800, 43,000,000 lbs. The value of the exports of cotton manufactures during the same period had increased from £355,000 to £6,040,000. But rapid as was this progress, it has been very much exceeded since, until at last Liverpool has become the most important commercial port in the world. Some idea of the rapid increase of wealth in Liverpool may be gathered from the fact that the corporation in the year 1758 valued their property as being worth £2000 a year; whereas from a return published in 1884 it appears that the value as now assessed to the poor-rate is upwards of £740,000 per annum. The following figures will give the best idea of its progress from 1801 to 1884:—

	Pop.	Vessels.	Tonnage.	Dock Dues.
1801, . . .	77,708	5,060	459,719	£28,365
1831, . . .	205,572	12,537	1,592,436	183,155
1861, . . .	413,938	21,095	4,977,272	411,417
1881, . . .	552,125	20,219	7,893,948	1,051,327
1884, . . .	573,202	23,910	8,800,362	1,056,864

It will be seen that the town is increasing in population at the rate of 5000 a year. The commerce of the port is shown in the annexed table:—

	Sailing.		Steam.		Total.	
	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.
Number of vessels on register 1st January, 1885, . . .	1,890	1,639,915	634	501,895	2,494	1,541,910
Entries in 1884—Coastwise,	3,500	284,769	8,986	1,516,586	12,486	1,831,295
" " From the colonies and foreign countries,	1,641	1,347,965	3,367	4,625,847	5,208	5,973,812
Total entries,	5,341	1,632,674	12,353	6,172,433	17,694	7,805,107
Clearances in 1884—Coastwise,	5,916	458,501	5,803	1,880,456	10,819	2,338,957
" " To the colonies and foreign countries,	2,199	1,491,128	2,309	2,929,649	4,508	4,419,777
Total clearances,	7,215	1,949,629	8,112	4,800,105	15,327	6,758,734

But the most striking idea of the vast commerce of Liverpool is furnished by the fact that the value of its exports is two-thirds that of all the other ports in England together—including London—and that its imports are only surpassed by those of London. The chief articles of export are cotton manufactures (valued at over £40,000,000 per annum), cotton yarn, hardware and cutlery, iron and steel manufactures, and woollen goods of various kinds. The articles imported in the largest quantities are raw cotton, corn, hides, palm oil, rice, tobacco, wool, sugar, rum, pro-

visions, and timber. The customs revenue derived at the port in 1884 was £2,791,409. The relative importance of the commerce of Liverpool, as compared with London and Glasgow, is shown by the following figures for the year 1884:—

	London.	Liverpool.	Glasgow.
	£	£	£
Imports, . . .	141,901,621	105,036,480	11,966,872
Exports, . . .	94,002,075	97,857,705	14,872,926

In 1876 the new landing-stage, replacing the one unfortunately destroyed by fire in 1874, was completed. It is 2062 feet in length and from 80 to over 100 feet in width. Its importance may be estimated by the fact that, independently of the great ocean liners which embark their passengers by tenders from it, there are no less than 50,000 passengers using the various ferries across the river every day. In 1884 the ferry traffic to and from Birkenhead (Woodside Ferry) was 12,036,938; and Seacombe, Egremont, and New Brighton, 7,145,279 passengers. The estate of the Mersey Docks and Harbour Board now comprises a total of 1581 acres of dock space, or a continuous line of about 7 miles. Of this space 1075 acres, with 23 miles of quay margin, are on the Liverpool side, and 506 acres, with 9 miles of quay margin, on the Birkenhead side of the river. The value of the dock estate is represented by a bonded debt which amounts to the enormous sum of £20,000,000. The navigation of the Mersey is under the control of the Mersey Docks and Harbour Board. Railway communication between Liverpool and Birkenhead, by means of a tunnel under the Mersey, was completed in 1885.

The principal streets are Dale Street, Castle Street, Lord Street, Church Street, Bold Street, Lime Street, and London Road. The chief squares are Abercromby, Falkner, and St. George's. The tramway system is now so far completed that most of the omnibuses in the city have been superseded. There is an underground railway system, which is extensively used for the conveyance of goods. In 1881 the Prince of Wales visited Liverpool, and opened the Alexandra Docks. A little earlier in the same year the foundation stone of the new Liverpool waterworks at Vyrnwy was laid by Earl Powis.

Among the eminent natives of the town may be mentioned the names of George Stubbs the animal painter, and William Roscoe the author, besides Matthew Gregson, compiler of the "Fragments," and Charles Okill, collector of its Records, the Right Honourable W. E. Gladstone, as well as many others. Sir J. A. Pictou's "Memorials of Liverpool" is the latest history of the city.

Liverpool, Toxteth, Bootle, and Kirkdale on the Lancashire side of the Mersey, and Birkenhead, Seacombe, &c., on the Cheshire side, form one vast nucleus for trade and commerce by the river Mersey and its railway system to all parts of the world. In its immediate neighbourhood are two fine parks, Knowsley and Croxteth, the residences of the earls of Derby and Sefton.

The lifeboat stations near Liverpool are—Liverpool landing stage, two boats; New Brighton, one; Formby, one; Hoylake, one; Hilbre Island, one; and Point of Ayr, two.

LIVERWORTS. See **HEPATICÆ.**

LIVERY. During the earlier period of English history, when the feudal system had permeated all ranks of society, the wearing of livery was not confined to domestic servants as it is now. Each class wore the livery of their superiors; the armed retainers wore that of the noblemen whom they served; the son of a gentleman wore that of a knight; and the knight that of the duke; and even the duke's son, as page to the prince, wore the prince's livery. In London, the freemen of the trade guilds or companies are called liverymen; and it was anciently the custom to allow each of them 20s. a year towards the purchase of a suit of the livery of their respective companies, that they might make a splendid appearance in civic pageantry. The liverymen elect the common council-men, sheriffs, and aldermen of the city; and before the Reform Bill of 1832 they were the exclusive constituency of the city of London. See the following article.

LIVERY COMPANIES OF LONDON. The origin of the term *Livery Company* is seen at once in one of the early regulations of the Mercers' Company—"That all the mystery should be clad in a suit (that is, a livery) once a

year at Easter." There was also to be an annual dinner, and every liveryman, whether present or absent, was to pay 2s. for himself and 1s. for his attendant if present. Four masters were to be chosen, "to whom all of the said mystery should be obedient, and if any one should be disobedient thereto none should buy of or sell to him, or bear him company, nor should he have the livery until he should be willing to redress the wrong." Each member was to pay 20s., on taking an apprentice to pay 2s., and the apprentice himself was to pay 2s. at the expiration of his term. Disputes between members were to be settled by the masters, if possible, without recourse to law; the money of the mystery was to be in the hands of the masters "to traffic with it and gain, and that they should remember to render a good account at the end of the year." Members reduced to poverty "by adventure at sea, debtors, or helplessness of body" were to be relieved; and "every man of the said mystery should be ready to attend the four masters at whatever hour he might be reasonably summoned on pain of paying 4d. each time of failing." The masters were elected for one year, and were not re-eligible for five years afterwards. Such was the Mercers' Company, or, as it described itself, "the folk of the mercerie, a member of the city"—in the middle of the fourteenth century. Its incorporation took place on this basis in 1393. This first charter is a remarkable document. It sets forth that "in consideration of 100 marks paid into the hanaper" the king had granted the Mercers "that they should be of themselves one perpetual community." They are then licensed to acquire lands, tenements, and rents, to the amount of £20 per annum "in aid and support, as well as of poor men of the said commonalty and mystery as of one chaplain to celebrate divine service for the prosperous state of the king and queen and for their souls, &c., and those of the father and mother of the king," and so forth. Early in the fifteenth century we find the company providing standard brass measures, and generally regulating the trade. There was a fight in the city in 1457 between the Mercers and the Lombards, and Cantelowe, mayor and alderman, was summoned before the king's council at Coventry and thrown into prison at Dudley Castle. The Mercers' was already at that time a leading company in London.

In the article **GUILDS** it has been shown how the Craft Guilds (or Companies) of London very early rose to great importance, and practically took the municipal government of the great city into their hands by the close of the fourteenth century. There were twelve great Livery Companies and sixty-two small ones still existing in 1881, when the City Companies' Commission was appointed, as well as the four small companies of the Carmen, the Fellowship-Porters, the Parish Clerks, and the Watermen, which had no livery; total, seventy-eight. In the course of time the following among other ancient companies had ceased to exist before that date—viz., the Comb-makers, the Gardeners, the Long-bowstring makers, the Pavours, the Tobacco-pipe makers, and the Silk Throwsters. The list of the seventy-four Livery Companies of London existent in 1881 is as follows, the twelve great companies being put in italics.

Apothecaries, Armourers, Bakers, Barbers, Basket-makers, Blacksmiths,* Bowyers,* Brewers, Broderers,* Butchers, Carpenters, Clockmakers,* Clothworkers,* Coach-harness makers, Cooks,* Coopers, Cordwainers, Curriers, Cutlers, Distillers,* Drapers, Dyers, Fannmakers,* Farriers,* Feltmakers,* Fishmongers, Fletchers, Founders, Framework-knitters,* Fruiterers,* Girdlers, Glass-sellers,* Glaziers,* Glovers,* Gold-wire Drawers,* Goldsmiths,* Grocers, Gunmakers, Haberdashers, Horners,* Innholders, Ironmongers, Joiners, Leather-sellers, Lorimers,* Masons,* Mercers, Merchant Taylors, Musicians,* Needle-makers,* Painter-stainers, Pattern-makers,* Pewterers, Plasterers,* Playing-card Makers, Plumbers,* Poulterers, Saddlers,

Salters, Scriveners, Shipwrights,* Skinners, Spectacle-makers,* Stationers, Tallow Chandlers, Tilers and Bricklayers,* Template Workers,* Turners,* Upholders,* Vintners, Wax Chandlers, Weavers,* Wheelwrights,* Woolmen.** Those marked with an asterisk (*) have no hall; the rest have halls, usually very handsome and commodious structures, in which the court of the company dines at stated intervals after the transaction of business, and the livery at rarer intervals, usually once a year.

The "pious founders" of the middle ages, desiring, when taking the last long journey whence there is no return, to benefit those less blessed with worldly goods, used to give these companies legacies, of course not for the benefit of the companies, but for them to use as trust for charitable or for trade purposes. But in the course of time the functions of these companies ceased. The government of London passed from their exclusive control, and by the time of the Tudors they had lost the supervision of their own trades. The Fishmongers still exercise some control over the great market at Billingsgate, the Goldsmiths and Stationers do useful work, but all the rest are little more than dining clubs and close charitable societies, with no relation to their respective trades in the least. Some have done a little better than this—the Haberdashers, Merchant Taylors, and (till 1876) the Mercers supported fine public schools; but many ate, drank, and gave away the bulk of their large revenues, which they claimed to enjoy, not as trust money, but as corporate property, after the actual trust is fulfilled. Since a fund giving £10 a year originally now often yields £1000, the company paid the £10 religiously and retained the balance for their own purposes.

So serious a state of things at last could be no longer borne, and the City Companies' Commission was appointed in 1881 to investigate the facts. The annual income of the companies in 1880 was found by this commission to be no less than £500,000, and the capital certainly over £15,000,000. It is instructive to see the statement of income of the twelve companies, divided as they themselves returned it into corporate and trust funds, and assuredly not overstated:—

	Income for 1880.	Corporate	Trust.
	£	£	£
Mercers,	82,758	47,341	35,417
Grocers,	38,236	37,736	500
Drapers,	78,654	50,141	28,513
Fishmongers,	50,713	46,913	3,800
Goldsmiths,	51,297	43,505	10,792
Skinner,	28,927	18,977	9,950
Merchant Taylors, . .	13,311	31,243	12,968
Haberdashers,	29,032	9,032	20,000
Salters,	21,010	18,892	2,118
Fishmongers,	21,647	9,625	12,822
Vintners,	10,887	9,365	1,522
Clothworkers,	50,458	40,158	10,000

The inquiry as to the constitution of the companies and the distribution of their funds lasted four years, and the report is the longest ever drawn up, extending to five bulky volumes.

In nearly all the companies there were three grades of membership—(1) simple membership, the possession of the freedom, which makes a freeman or freewoman; (2) membership of what is called the livery; (3) a place on the court or governing body. From time immemorial the freedom of the companies has been obtained in two ways—by apprenticeship or by patrimony. Besides this, admission has from a very early period been either sold or conferred as a distinction, and in these cases the livery is said to be obtained by redemption or conferred *honoris causa*.

The terms apprenticeship and patrimony sufficiently explain themselves, the one being an independent method of entry, the latter an hereditary privilege. The freemen constitute the main body of the company, but their privileges are few. Above the freemen are placed the livery, admission to which takes place by call of the court, and in the same manner vacancies in the court itself are filled up from the livery by co-optation. The fees payable in respect of the several promotions were found to be considerable, often amounting to £100. A person joining a considerable London company by purchase might, in his progress from the position of a mere freeman to the mastership, have to pay £200, or even upwards of £300, in fees and fines. The number of members on the courts varied from about twelve to between thirty and forty.

It was estimated by the commissioners that there might be 20,000 freemen altogether. The number of liverymen on the city parliamentary register for 1882, all liverymen having a parliamentary vote as such, was 7319, ranging from 452 in the case of the Fishmongers to seven in the case of the Horners. Of these 7319 liverymen about 1500 form the courts of the companies. "We have observed," say the commissioners, in concluding this portion of their inquiry, "that admission by patrimony produces a natural effect on the constitution of the livers and of the courts. Where a family continues prosperous from generation to generation, it acquires a position of considerable importance on the court and livery of a company. A remarkable instance is that of the Mercers' Company, the court of which is recruited from a livery of ninety-seven, on which certain families are represented by as many as nine or ten members."

As the Mercers' Company is acknowledged to be the leading company of London, a consideration of its affairs will serve as a type of the rest. It not only stands first in civic precedence, but it is the richest of all. Its revenue for 1880 was £82,758, of which £47,341 is corporate income, and £35,417 is received and expended in the carrying out of trusts. Yet, so far as numbers are concerned, the Mercers' Company is the smallest of the twelve great companies. It is, as said above, entirely in the hands of ninety-seven persons. Yet it is quite clear from the full history of the company, given in reply to the questions of the commissioners, that from its foundation it was regarded by the crown, and treated by its own members and benefactors, as a public institution. It is a relic of mediæval times. Gilbert A'Becket, father of Thomas archbishop of Canterbury, appears to have been a mercer; and so early as 1192, when Thomas A'Becket's sister founded the hospital of St. Thomas of Acon, on the spot where the archbishop was born, she constituted the then existing fraternity of Mercers' patrons of the hospital. The word "mercier," we are told, "is merely a translation of the Latin *mercator*, through the French *mercier*." The mercer was a dealer in small wares; in everything that was sold by retail by the little balance or small scales, including toys, haberdashery, and other articles connected with dress, and also spices and drugs—in short, what at present constitutes the stock of a general country shopkeeper. Cervantes bought his Arabic original of "Don Quixote" of a book mercer, and Skinner, in his "Etymologicon," published in 1671, defines a mercer as *mercator peripateticus*—an itinerant merchant. Yet the folk of the "mercerie," as they call themselves in a petition to Parliament in 1386, do not seem to have been pedlars; for in one of their records in the fourteenth century is found the rule that no one should take as an apprentice one who had carried packs through the country, nor the son of a slave. The company was formed for the cherishing of unity and for the common profit of the mystery. It superintended the taking of apprentices by its members, tested the weights and measures of shopkeepers who belonged to it,

and undertook the general regulation of the mystery of mercery in the city of London.

The first important trust committed to the Mercers' Company was that of Sir Richard Whittington, four times Lord Mayor of London, who had been several times appointed Master or principal warden of the Mercers' Company. Whittington died in 1422-23, and, among other benefactions, left money for the building of almshouses and a college to be in the keeping of the Mercers' Company. In the next century Dean Colet, who was a member of the company, founded St. Paul's School and put the endowment into the hands of the Mercers, who managed the school till the year 1876. In the course of the 500 years over which the history of this company extends, it has steadily grown in wealth, but it has not increased in numbers, and its public functions have ceased. But no one who glances through the crowded pages which detail its story from mediæval times down to the present day, and set forth the origin of its great endowments and its sources of revenue, can feel a moment's doubt as to the entirely public character of all its funds. In no sense whatever does any one of these endowments come under the description of private property. The money or property is all left to a public body for public purposes. Even if it had been on the whole well administered there is no justification in the history of the company, nor in common sense, for the contention of the holders at the time of the commission that the administration of these vast revenues should be left to ninety-seven persons. This is a vast public estate, it belongs to the community, and it should be administered on behalf of the people of London by persons who are responsible to them.

The true income of the Mercers was in 1880 probably about £100,000 a year; the total contributions of the members were £40, and for this they received back in court fees, entertainments, and pensions, £19,000 a year; spent £8000 in salaries, and gave £15,000 more to various benevolent purposes. The Drapers' Company proved to be about as rich as the Mercers, the members contributing £270 a year, and getting back £14,000. The Goldsmiths contributed £550, and received £15,700 in court fees, entertainments, and pensions. The Salters contributed £200, and spent on themselves £8000. The Fishmongers, Goldsmiths, and Clothworkers each had nearly £60,000 a year. The Grocers, out of a much smaller income, paid upwards of £20,000 to benevolent objects, and spent under £1000 a year in court fees. The entertainments of the Fishmongers, including hall expenses, sometimes cost upwards of £9000 in a year. Their court fees, salaries, and office expenses sometimes reached upwards of £7000 in a year. Their voluntary contribution to benevolent purposes in 1880 was £20,000. The Skinners spent £12,000 a year out of £18,000 corporate income in court fees, salaries, entertainments, laying down wine, and the maintenance of the hall. The Vintners spent £8000 out of a corporate income of £9500 in the same self-regarding manner. The Barbers spent their small corporate income of £700 a year entirely on themselves. The Founders, out of an income of about £1500 a year, were giving £50 to benevolent objects. The Saddlers spent £7000 a year out of £10,000 in court fees, salaries, entertainments, and maintenance, and so on. In fact out of £800,000 a year the companies were spending £250,000 on maintenance (fees and salaries) and sheer eating and drinking.

It was found that only in London and Switzerland did these mediæval guilds continue. In the provinces they were allowed to die down, and the survivors shared the property among them—a course followed in a most unblushing manner by the lawyers of Staples Inn and Serjeants Inn in 1884. In France the guilds were reorganized by Colbert in 1673, were attempted to be

suppressed by Turgot in 1776, and finally perished in the third year of the Revolution in 1791. In Belgium they were suppressed in 1794. In the Netherlands they were suppressed in 1798. In Germany they were placed under state control in 1869, and were reorganized in 1878 in a manner not unlike that suggested by Mr. Haare to the commissioners. In Austria-Hungary they were the subject of legislation in 1859. In Italy Acts were passed for their regulation in 1878 and 1879. In Spain the state interfered in 1836. In Portugal they were suppressed in 1834. In Switzerland alone they have never been interfered with, and there they still possess considerable property, though nothing to compare with that of the London city companies. The recommendations of the commissioners, which appeared in 1885, certainly did not err on the side of severity. They proposed to treat the city companies exactly as the universities had been treated. These corporations have been frequently taken in hand by the state, and their revenues have been inquired into, tabulated, and assigned according to the good pleasure of a parliamentary commission. The companies should be treated in the same way; a commission should issue, with power to assign a portion of the corporate revenues to objects of acknowledged public utility, to better administer the trust funds, and, where necessary, to reconstitute the companies. Minor recommendations were, that admission to the livery should not in future confer the parliamentary franchise, and that the companies should publish their accounts. As to the definition of objects of acknowledged public utility, it included education in its widest sense, the support of hospitals, picture galleries, parks, and open spaces, and even the improvement of workmen's dwellings, and subsidies to the benefit societies of the trades represented by the companies. It may well be that before this generation has made way for the next it may see a great scheme of secondary education for the capital and a great system of free libraries organized out of the money which used to be wasted on entertainments that brought little pleasure and less profit to the entertained.

LIVIA. Any lady of the great plebeian *Livian gens* or clan of ancient Rome, one of its most illustrious *gentes*, would be called Livia.

The most celebrated Livia was a member of the family of Drusus, the chief family in the *gens*. Livia Drusilla was the daughter of Livius Drusus Claudianus. She was the wife of Tiberius Claudius Nero, and the mother of the young Tiberius, afterwards to be emperor; and she was already far gone in pregnancy with a second son (Drusus) when the Emperor Augustus saw her and conceived so violent a passion for her that he compelled Tiberius Nero to divorce her, and himself married her, *b.c.* 38. Drusus was born after their marriage; but by Augustus himself she never had any children. Livia was very beautiful, and as clever as she was beautiful. Augustus held her judgment very high. Her small palace is still preserved in the Palatine at Rome, Tiberius, when he became emperor, religiously guarding intact his mother's dwelling. Livia is darkly accused, though no evidence is offered, of causing the death of the grandsons of Augustus, and of hastening the end of the emperor himself. If so, she was much punished; for on her son Tiberius coming to the empire she sought to continue and increase her authority, but was at once banished from all public work. She offended Tiberius in some way very deeply, and though he treated her well he forbade the senate when it sought to consecrate her after death. Livia died *A.D.* 29, aged 82.

LIVINGSTONE, DAVID, missionary to Africa, and the greatest explorer of that vast continent, was born at Blantyre, Lanarkshire, Scotland, 19th March, 1813. Mr. Neil Livingstone, his father, was but a small tradesman near Hamilton, Lanarkshire, and the early youth of his son David was spent as a "hand" in the cotton mills in the

neighbourhood of Glasgow. While working at the Blantyre Mills Livingstone attended an evening school, where he imbibed an early taste for classical literature and for works on religion and natural science. He also acquired an intense longing towards a missionary life in China, and to qualify himself for such an enterprise set himself to obtain a medical education, in addition to that he had already acquired so laboriously, and this he supplemented by botanical and geological explorations in the neighbourhood of his home.

At the age of nineteen he commenced attending the medical and Greek classes in Glasgow in the winter, and the divinity lectures of Dr. Wardlaw in the summer. His reading while at work in the factory was carried on by placing his book on the spinning-jenny, so that he could catch sentence after sentence while he went on with his labour, thus keeping up a constant study undisturbed by the roar of machinery.

Having completed his attendance on Dr. Wardlaw's lectures, and having been admitted a licentiate of the Faculty of Physicians and Surgeons, he now offered his services to the London Missionary Society as a candidate for missionary work. His offer was accepted, and in 1840, after a few months' theological study in England, he was ordained to the pastoral office and despatched to Southern Africa. In Natal he became acquainted with the Rev. Robert Moffat, whose daughter subsequently became his wife and the faithful and zealous sharer of his toils and travels. From 1840 to 1849 Dr. Livingstone pursued his missionary labours, first in Natal, then at an inland town in the Bechuana country called Kuruman, about 700 miles from Cape Town, Matsiela, Chonare, and other stations.

His first essay as an explorer was in 1849, when he made his first journey in search of Lake Ngami. In 1852 he commenced, in company with his wife, what he himself calls his "great journey" to Lake Ngami, so fully described in his "Travels." In 1852 and the three following years he undertook several expeditions into the interior of Southern Africa, during which he made himself acquainted with the languages, habits, and religious notions of several savage tribes previously unknown to Englishmen, and twice crossed the entire African continent a little to the south of the tropic of Capricorn, from the shores of the Indian Ocean to those of the Atlantic. In 1855 the Victoria gold medal of the Geographical Society was awarded to Livingstone in recognition of his services to science in thus traversing the African continent, in the course of which explorations he passed over no less than 11,000 miles of land, for the most part untrdden by any European, and up to that time believed to be inaccessible.

In 1856 Livingstone returned to England, the pioneer of a vast amount of sound knowledge respecting the sites of places, hills, rivers, and lakes hitherto nearly unknown; while his ample information as to the physical features, climatology, and even geological structure of the countries he had explored, served to point out many new openings for British commercial and philanthropic enterprise. He especially advocated the growth of cotton in Africa, and the fostering of commercial intercourse with Southern and Central Africa, as one of the surest means of exterminating the curse of the slave trade.

Early in 1858 Dr. Livingstone returned to Africa to prosecute his researches still further. He went back with the good wishes of the entire community at home, who were deeply touched by his manly, modest, and unvarnished narrative, and by the absence of all self-seeking in his character. He also carried with him the patronage and support of the British and Portuguese governments, and was honoured before his departure with a private audience of the Queen, was banqueted in London, where a "Livingstone testimonial" was also raised to provide two small steamers for the ascent of the Zambesi.

In this second expedition Livingstone discovered the lakes Nyassa and Shirwa, and explored the regions to the west and north-west of Nyassa. The geographical results were the discovery of the real mouths of the Zambesi, and the exploring of the immense territory around that river and its tributary, the Shire—results not only of much interest, but the value of which is very great, and which will be enhanced as this part of Africa is gradually brought within the sphere of civilization and commerce.

Returning again to England in 1864, Dr. Livingstone published the result of his researches in the "Narrative," a work so highly appreciated that, like the "Travels," it obtained a sale of more than 80,000 copies.

At the close of 1865 Livingstone left England for the third and, as it proved, the last time, under the auspices of the Geographical Society, to prosecute further researches, which it was hoped would throw a light on that mystery of more than 2000 years' standing—the real sources of the Nile. He was also accredited as her Britannic Majesty's consul to the various native chiefs of the unknown interior.

Entering with enthusiasm into the task before him, Dr. Livingstone had soon penetrated far beyond the region from which any definite tidings could be heard of him from time to time. Month after month passed without any news of the intrepid traveller, until tidings of his violent death at the hand of a tribe of Mafites reached England, and the government, in concert with the Geographical Society, despatched an expedition to ascertain his fate. Without succeeding in finding Livingstone, the party met with sufficient evidence to show that he was still alive, though deserted by the Johanna men, who had originated the rumour. In 1868 he was once more reported to be killed, but the news again happily proved to be false.

In 1869 Dr. Livingstone resolved to strike westwards from his headquarters at Ujiji, on the Tanganyika Lake, in order to trace out a series of lakes which lay in that direction, and which, he hoped, would turn out eventually to be the sources of the Nile. Meantime the anxiety respecting his fate had become intense, and other expeditions were organized to search for him, and to convey the supplies which it was rightly judged would by this time be most acceptable. Towards the close of 1870 he was discovered by Mr. H. M. Stanley, a gentleman despatched by the private enterprise of Mr. J. G. Bennett, of the *New York Herald*. Reinforced by the ample assistance and supplies conveyed by Mr. Stanley, Livingstone continued his journeys round Lake Tanganyika. His main object now was to visit a spot to the east of Lake Bangweolo, where, according to native information, there were four fountains, sources of the rivers Lulua and Lulira, which form the great Lualaba; and of the identity of this river with the Nile he seems to have been strongly impressed. These fountains he conjectured to be the sources of the Nile mentioned by Herodotus, and he trusted to be able to prove them to be the veritable springs of the Nile, and to gain the glory of being alone their discoverer. He appears to have reached the point at which he expected to find the fountains, and in returning had to work his way through an inundated country, in which for hours together the water was above his waist. Exposure and fatigue brought on dysentery, and the great explorer died at Ilala, after fifteen days' illness, on the 4th May, 1873.

Accepting the eminent authority of Dr. Beke and Sir Samuel Baker, Livingstone may be said to have achieved the object of his ambition, and afterwards to have laid down his life at the goal of his labours, the very source of the Nile—viz., at the fountains of the streams flowing into the south end of Lake Tanganyika, the most distant reservoir of the great river. It will be long before his name is forgotten throughout the vast region of his discovery. The tradition of the grand old Christian soldier, so gentle and humane, yet so brave and resolute, will be handed down;

and it may be confidently hoped that the presence of such a man among the tribes of Africa will leave no small permanent impression for good.

Dr. Livingstone's remains were brought to England, where, amid every mark of honour and affection from all classes, they were interred in Westminster Abbey on 18th April, 1874. His "Last Journals," issued in 1875, are exceedingly interesting. His "Personal Life," by Dr. W. G. Baikie, was published in 1880.

LIVONIA, one of the Baltic provinces of Russia, bounded N. by Esthonia, E. by Lake Peipus and Pskow, S. by Vitepsk and Courland, and W. by the Gulf of Livonia or Bay of Riga. The area is 18,160 square miles; the population at the last census was 1,149,300, very mixed, and mostly Lutherans. The surface is generally level, with here and there some hills, which rarely exceed 100 feet in height. Livonia is covered with vast forests, lakes, rivers, marshes, and heaths. The soil on the sea-coast, which is bounded by high cliffs, is very sandy; in the interior, sand, clay, loam, and moorland alternate, but there are also many very fertile tracts. In the south, especially on the banks of the Duna, there is some very picturesque scenery. Most of the forests and marshes are in the west. Of the lakes, 1120 in number, the most considerable are—the great Lake of Peipus, 1090 square miles in area, united by a narrow channel with that of Pskow on the north-east; and the Lake Wirzjauw, 80 square miles in extent, in the centre of the province, and connected by the Great Embach River with Lake Peipus. The principal river is the Duna, which is the boundary between Livonia and Courland till it reaches Kirchholme, whence it runs north-west into the Bay of Riga at Dünamunde. The smaller rivers and streams are very numerous.

The climate is cold and raw from October till the end of May; very hot in the three summer months. September has some fine days, but the nights are often frosty.

The chief occupations of the inhabitants are agriculture and the distillation of spirits. The country produces rye and barley, flax, hops, hemp, and linseed. The fruit, such as apples, plums, and cherries, is very indifferent. There are some good horses on the estates of the nobles, but those of the peasantry are small and of little value. The horned cattle are small; sheep of the German breed are kept by the nobles; the peasants have an inferior breed, the coarse black wool of which is manufactured into cloth. Goats, swine, and domestic poultry are kept. There is abundance of game and white and gray hares; the other wild animals are bears, wolves, lynxes, foxes, beavers, otters, martins, badgers, and squirrels. The Lake Peipus abounds in fish. There are no minerals, nor manufactures of importance, except in Riga. The exports are corn, hemp, flax, and linseed; the imports are salt, iron, lead, colonial produce, wine, manufactured goods, and articles of luxury.

The chief towns in the province of Livonia are Riga, Dorpat, and Pernau. The fortress of Dünamunde, built on an island, in the estuary formed by the embouchures of the Duna and the Aa, deserves mention for its lighthouse, and as defending the entrance to the harbour of Riga.

Livonia was conquered by the Danes in the twelfth century, and held by the Teutonic Knights from 1316 to 1561. It afterwards belonged to Poland, and next to Sweden; but was definitively annexed to Russia, by the treaty of Nystadt, in 1721.

Language. See remarks under LITHUANIA.

LIVRE, an ancient French coin. The word is derived from the Roman *libra*, a pound. The old French livre was of two kinds—Tournois and Parisis, the latter being equal to $\frac{1}{4}$ of the former. This was on account of the rate of money, which was one-fourth higher at Paris than at Tours. The old livre was worth nearly the same as the franc, or to be exact, eighty francs were worth eighty-one livres Tournois.

Livre (pound) was also the ancient French unit of weight, and was equal to 17.267 oz. avoirdupois current English weight; the KILOGRAMME has taken its place.

LIVY (*Titus Livius Patavinus*), the Roman historian, was born at Patavium (Padua), B.C. 59. We possess very few particulars respecting his life. He appears to have lived at Rome, and to have been on intimate terms with Augustus, who used, according to Tacitus, jocularly to call him a "Pompeian," on account of the praises which he bestowed upon Pompey and his followers; a great commendation on the fairness of Livy's judgment. He also encouraged the historical studies of Claudius, afterwards emperor. He died A.D. 17, in his seventy-sixth year.

Livy's great work, which was originally published in 142 books, gave an account of the history of Rome ("Annales") from the earliest period to the death of Drusus, B.C. 9. Of these books only thirty-five are now extant, namely, the first ten, which contain the history of the city to 293; and from the twenty-first to the forty-fifth inclusive, which commence with the Second Punic War (218), and continue the history to the conquest of Macedon (167). There also exist brief epitomes of the lost books, as well as of those which have come down to us, though these have been frequently supposed, but without sufficient reason, to have been compiled by Florus.

Tacitus and Seneca, among the later Roman writers, speak in the highest terms of the beauty of Livy's style and the fidelity of his history—praises which have been constantly repeated by modern writers. The charm of Livy is almost as great to us as to his contemporaries. With them his fame was so great that a Spaniard is known to have travelled from Cadiz to Rome, an enormous labour in those days, simply to look upon Livy. That done, he returned home again. About the exquisite beauty of Livy's style there can be no two opinions [see LATIN LANGUAGE]; but as to his merits as an historian the case is not quite so clear. It can be proved that he did not consult those ancient authorities which existed in his day. He took much of his work at second-hand, very rarely compiling from original sources. His object was to bring the various histories together into one readable popular narrative, and wonderful was his success.

LIZARD is the common name of the Lacertina, an order of REPTILES. Lizards have in general an elongated slender body supported on four short legs. They display great variety in their mode of progression, creeping, walking, running, climbing, swimming, and a few even being capable to a certain extent of supporting themselves in the air. In the greater number, however, the limbs are too short and weak, and too far asunder to support easily the weight of the long and proportionately bulky body, or to allow of much rapidity of movement. The variety of their habits of life may be inferred from the striking differences which obtain in the development and structure of the limbs. Some have slender and highly-developed toes, with a long, conical, and pointed tail, like the common lizards of this country (Plate, fig. 2.) These are evidently fitted for an exclusively terrestrial mode of life and a residence in sandy plains or stony deserts. Others have their toes expanded on their under surface, short thick feet and tail, and a broad flattened form of body, like the geckos (fig. 16). These creatures are enabled to adhere to smooth surfaces, to traverse walls or ceilings like a house-fly, and to remain fixed there for any length of time. In the dragons or flying lizards (fig. 10), we see membranous expansions on each side of the body, supported by elongated ribs, and capable of being spread out like a fan. These balance themselves in the air, as if by means of a parachute, and dart, by long flying leaps, from one branch or tree to another. In another group we find animals endowed with, comparatively speaking, long and slender feet, the toes placed in opposite directions, like pincers, and a prehensile

tail, as the chameleons (fig. 15). These animals are well adapted for climbing trees and perching upon the branches like birds. In others the limbs undergo various stages of degeneration (figs. 3, 5, 12, 14), till at length only the rudiments of the pectoral and pelvic girdles remain, no traces of limbs are visible externally, and the lizards acquire a serpentiform body and glide on their expanded ribs like serpents.

The body is covered with horny scales of various sizes and figures, or with granulations. The vertebrae or bones of the backbone are *procatous*, that is, concave in front and convex behind; in the geckos, however, and also in the *sphenodon*, a singular New Zealand lizard, the vertebrae are concave at both ends (*amphicalous*), like those of fishes. The lower jaw is united to the skull by the *quadrate* bone, which (except in *sphenodon*) is movable on the skull. The teeth are usually small, simple, conical, isolated, and without fangs. They are never inserted in sockets, but are placed either on the inner side of the margin of the jaws (*placodont*) or on the top of the tooth-bearing bone (*acrodont*). The tongue is usually fleshy and protractile; it is sometimes short and thick, or slender and bifid, as in the English lizards, or long and club-shaped, as in the chameleons. The breast-bone or *sternum* is generally very large, and a large *interacricle* lies partly on the sternum and partly between the two shoulder-girdles. Many lizards have glands with pore-like openings (*fimoral pores*) on the thighs. The readiness with which many lizards part with their tails is a matter of common knowledge. This is explained by the fact that the muscles of several vertebral segments of the tail are loosely connected, and the middle of each vertebra is traversed by a thin unossified transverse septum; so that any of the vertebrae easily snaps in two, and the portion of the tail is broken off. The tail grows again, but the vertebral column in the renewed portion is represented by a cartilaginous rod.

Most of the animals belonging to this order feed entirely upon living prey, their food consisting of small mammals and birds, fishes, molluscs, and insects. Some of the iguanas and agamas are herbivorous. Many of the geckos are nocturnal. The only lizard which enters the sea is a species of iguana, *Amblyrhynchus cristatus*, which lives in the Galapagos Islands and swims with ease, feeding on sea-weeds. None of the lizards are poisonous except two species of *Helodermata*, which inhabit South America. Lizards are oviparous or ovo-viviparous, and do not produce many young at a birth. Many of them grow very slowly, and the duration of their life is in general very lengthened. Many in course of time acquire large dimensions, as the monitors and iguanas. They are chiefly to be found in very warm and humid climates. Egypt, for example, the temperature of which is so burning hot, while the soil is periodically moistened by the overflowing of the Nile, possesses an immense number of lizards, and they are remarkable there for their liness, their agility, and the vigour of their movements. England only possesses three lizards, the Sand Lizard (*Lacerta agilis*) and the Viviparous Lizard (*Zootoca vivipara*), both belonging to the family *LACERTIDÆ*, and the BLIND-WORM (*Anguis fragilis*). Even in temperate Europe the number of species is scanty, and in higher latitudes these reptiles are altogether absent.

The flesh of many lizards is held in high repute in the countries in which they are found as an article of food. In America the iguanas are regarded by epicures as a great delicacy, and in Asia the Skinks are considered to have aphrodisiac powers. Medicinal properties have been attributed to many, especially by the Arabian physicians. One species, the Adda of the Arabians (*Scincus officinalis*), formerly obtained a place in the British *Materia Medica*, since its flesh was supposed to be a restorative, and of great avail in leprosy and other diseases.

The order *Lacertilia* is variously subdivided, the sub-ordinal distinctions being by some based on the characters of the skull, by others on those of the tongue. The following is a list of the principal families:—*Monitoridæ*, containing the MONITORS (Plate, fig. 1) and the poisonous lizard *HELODERMA*; *Ameividæ*; *LACERTIDÆ* (fig. 2), containing the common English lizards; *Zonuridæ* (fig. 3), *Chalcididæ*, *Cercosauridæ*, *Gymnophthalmidæ* (fig. 4), *Scincidæ* (figs. 5–7), containing the medicinal SKINK and the BLIND-WORM; *Acontiidæ*; *IGUANIDÆ* (fig. 8), containing the iguanas or leguans of tropical America, stellions, frilled lizard, and molech; *Amphisbænidæ* (fig. 14); *Agamidæ* (figs. 9–11), containing the agamas, dragons; *Chirotidæ* (figs. 12–13); *Chameleontidæ*, containing the CHAMELEONS (fig. 15); and *Geckotidæ*, containing the GECKOS (fig. 16). The *Hatteria* lizard (*SPHENODON*), from New Zealand, presents such remarkable characters that it must be placed alone.

LIZARD POINT, the most southern headland of England, situated in the county of Cornwall, in lat. 49° 57' 40" N., lon. 5° 12' 6" W., 24 miles E.S.E. of Land's End. The lights of its two lighthouses are 224 feet above the sea-level. It is composed of serpentine and diallage rock, with much mica interspersed.

LLAMA (*Auchenia*) is a genus of artiodactyle (even-toed) ungulates, of the family *Camelidæ*, and representing in the mountains of Peru and Chili the CAMEL (*Camelus*) of the desert of Arabia or Bactria—in dentition, very nearly. In outward form, excepting that there is no hump on the back; in the general structure and cellular apparatus of the stomach, with the concomitant power of abstaining for a long time from water; in the expression of the large, full, overhung eye; in the mobility and division of the upper lip; in the fissured nostrils; in the slenderness of the neck; and in the long woolly character of the clothing—the llama and the camel exhibit striking points of agreement.

The foot is somewhat modified, consisting in the llama of two springy toes completely divided, each having a rough pad beneath, and at the tip a strong hoof; these hoofs are



Guanaco (*Auchenia huanacus*).

pointed at the extremity, and hooked down somewhat like a claw; they are compressed laterally, and the upper surface presents an acute ridge, while the under surface is linearly concave, a form well fitted for security on the mountain range.

As a beast of burden in its native mountains, whether of Peru or Chili, the llama has yielded to the mule. But it is still most important on account of one of its qualities which attracted the attention of the ancient Peruvians: it is a wool-bearer, and that of no ordinary kind, the wool

approximating in its character to silk. Large quantities of this material are imported into Europe for the manufacture of shawls and other delicate fabrics, and its improvement in quality has been made a subject of earnest consideration and trial.

There is some dispute as to the number of species of the genus *Auchenia*. There are two wild species, the Guanaco or Huanaco (*Auchenia huanacus*) and the Vicuña (*Auchenia vicugna*). In addition, there are two domesticated animals, the llama and the alpaca, which are considered by some distinct species, but are probably domesticated varieties of the guanaco and the vicuña respectively.

The Guanaco (*Auchenia huanacus*) has a wide range, extending from the highlands of Peru and Chili to the plains of Patagonia and the wooded islands of Tierra del Fuego. It has a long head, long graceful neck, slender legs, and a short hairy tail. It stands about 3½ feet high at the shoulder. The fur is short and of a cinnamon brown. The Guanacos are wild and very wary; they live in herds, and according to Darwin, readily take to the water. The llama is generally larger than its wild ancestor. The wool is longer, but coarse, white, or spotted with brown or black. It is chiefly met with in the southern part of Peru.

The Vicuña or Vieugna (*Auchenia vicugna*) is smaller than the guanaco, being only 2½ feet in height, and its head is shorter. The wool is exquisitely fine, but short, and of a pale yellow brown. Thousands are annually killed



Vicuña (*Auchenia vicugna*).

in Peru for this material alone. It inhabits mountain ranges on the verge of perpetual snow. It is very active and wary, and has the disagreeable habit (found in all llamas) of spitting in the face when annoyed. The Páco or Alpaca is kept in large flocks in Peru and Bolivia. Its wool, which is often of an intense lustrous jet black, falls in long flakes, glossy and silken, reaching down to the knees.

Though the llamas are now confined to South America, their remains have been found in abundance in Pleistocene deposits in North and Central America.

LLANBEDR. See LAMPEFER.

LLANBERIS, a village of Wales, in the county of Carnarvon, is 257 miles from London, and 8 from Carnarvon, to which there is a branch of the London and North-western Railway. It is the headquarters of Snowdonian tourists, the scenery around, especially Llanberis Pass and lakes, being very fine. Most tourists ascend Snowdon from this place. There are several fine residences in the neighbourhood, good houses for the accommodation of visitors, and some excellent hotels. The neighbouring slate quarries are among the largest in Wales, and, with the lead mines, form the chief source of employment for the labouring inhabitants. The population in 1881 was 3033.

LLANDAFF' (*Llan-Tâf*, the church of the Tâf), a decayed city of Wales in the county of Glamorgan, though the seat of a bishop, now only a village with 800 inhabitants, is situated on the west bank of the Tâf, about 2 miles N.W. from Cardiff, and 173 from London by the Great Western Railway. The present cathedral, which is used as the parish church, comprehends the choir, transepts, and part of the nave of the old cathedral. The length is 300 feet and the breadth 80 feet. There is a Lady Chapel at the east end of the choir. The whole building has recently undergone a thorough restoration. The bishop's income is £4200 per annum. The district around Llandaff is very beautiful.

LLANDEILO FLAGS is the name applied to one of the members of the Cambro-Silurian formation, as developed in Wales. They consist of a series of darkly-coloured slates with beds of grit, sandstone, some sandy calcareous flags, and some subordinate beds of limestone; they occur abundantly about Llandeilo, Carmarthenshire, and at St. David's, also at Builth in Radnorshire. In Cumberland the whole of the Llandeilo beds are probably included in the green slates and porphyry series. The maximum development of these beds is over 2000 feet; they succeed conformably the Arenig beds, and pass insensibly into the overlying Caradoc sandstone. With the formations both above and below they have many fossils in common, but their specially characteristic fauna numbers about ninety-five species. Of trilobites, *Ogygia Buchii* is particularly characteristic, but *Asaphus tyrannus*, *Calymene cambrensis*, *Triucleus concentricus*, besides the genera *Barrandia* and *Eglina*, may be mentioned; among brachiopods, representatives of the genera *Cranidia*, *Leptana*, *Rhynchonella*, and *Strophomena* appear. Lamellibranchs and gastropods also have their representatives. Among cephalopods the genera *Endoceras*, *Orthoceras*, and *Piloceras* occur. Pteropods and heteropods are represented by *Conularia*, *Theca*, and *Bellerophon*, while the phyllopod *Pectocaris saptychoides* is peculiar.

The epoch at which the Llandeilo beds were accumulated was marked by a great outburst of volcanic action. In Carnarvon and Merionethshire interstratified igneous rocks occur associated with these strata; they are chiefly masses of lava with beds of stratified agglomerate and tuff, and are probably the products of a submarine volcano. In Cumberland there is a large development of volcanic rocks, some of which were probably ejected at this period.

LLANDOVERY BEDS. This is the name applied in geology to a group of strata largely composed of grits, conglomerates, and slate, with some minor calcareous beds. They are of Silurian age, and have their typical development in the vicinity of the town of Llandovery, Carmarthenshire. These beds are also known as the *Pentamerus Beds*, from the abundance, in certain bands, of the remains of a peculiar brachiopod, *Pentamerus*. The beds have been separated into two groups, Lower and Upper Llandovery; the former being placed at the top of the Cambro-Silurian, while the latter are considered to form the true base of the Upper Silurian series.

The *Lower Llandovery group* consist largely of a series of gray grits with bands of conglomerate; they attain a thickness of about 1000 feet in South Wales. In the neighbourhood of Llandeilo they are conglomeratic, succeeding the Bala or Caradoc group below; in the sections north-east of Llandovery these latter beds appear to pass upwards into them and the succeeding Upper Llandovery beds, the whole forming a conformable sequence. It is therefore considered that the Lower Llandovery beds form a transition series to the Upper Silurian—a supposition which receives considerable support from the mixed character of the fossil remains. The fauna is essentially of a Cambro-Silurian type, but some forms are common to either the beds below or above, while others occur in both

the preceding and succeeding formations. Thus of the fossil remains about 70 per cent. of the genera and 50 per cent. of the species occur also in the underlying Bala beds; while about 65 per cent. of the genera and about 51 per cent. of the species pass into the succeeding Upper Llandoverly group. One of the most characteristic and abundant fossils is *Stricklandinia (Pentamerus) lens*, but other not uncommon forms are *Nidulites farus*, *Murchisonia angulata*, *Meristella crassa*, and *Meristella angustifrons*. Among the forms common to the Bala beds may be mentioned the corals *Heliolites interstinctus*, *Petraria subduplicata*, and *Favosites aspera*; trilobites, as *Lichas laxatus* and *Illeenus Bowmani*; brachiopods, as *Orthis Actoniae* and *Orthis insularis*; gastropods, *Murchisonia gyrogonia* and *Cyclonema crebristriata*; and the cephalopod *Orthoceras tenuicinctum*.

The *Upper Llandoverly group* or *May Hill Sandstones* have a general beach-like character, and are mostly composed of beds of conglomerate, grit, or sandstone much impregnated with oxide of iron, with in places bands of impure arenaceous limestone, the "Pentamerus limestone." The outcrop of these beds extends north-easterly through Wales; to the south they rest conformably on the Lower Llandoverly beds, but on proceeding north they overlap successively the Bala and Llandello beds, till in Shropshire, near Church Stretton, they rest on the highly inclined Cambrian rocks of the Longmynd. The beds are highly fossiliferous, a most characteristic form being *Pentamerus oblongus*. Trilobites abound; of them may be mentioned *Phacops Stokesi*, *Encrinurus punctatus*, and *Calymene Blumenbachii*. brachiopods also are abundant, such as *Atrypa reticularis*, *Orthis calligramma*, and *Strophomena compressa*; lamellibranchs, gastropods, cephalopods also have numerous representatives.

LLANDUDNO, a modern and elegant watering-place of Wales, in the county of Carnarvon, situated in a beautiful bay, near the base of the Great Orme's Head, 9 miles N.N.W. of Conway, in a detached portion of the county, which forms its north-eastern extremity. The air is pure and bracing, and the facilities for sea-bathing are almost unequalled. The progress of the town has been remarkable, for only a few years since it was but a poor village. There are now numerous well-built terraces and crescents, churches, chapels, and several hotels. A first-rate water supply, brought from two lakes in the Snowdon range, was completed in 1880, when the works were opened by the Prince of Wales. The town is 10 miles S.S.W. of Liverpool, and 22 $\frac{3}{4}$ miles from London by the London and North-western Railway. There are craggy cliffs, remains of cyclopean walls of an ancient fortress, and copper mines in the parish. The population in 1881 was 4838.

LLANELLY is a seaport of Wales, in the county of Carmarthen, situated on a creek of Carmarthen Bay, 226 miles from London by the Great Western Railway, and 15 miles S.E. from Carmarthen, with which and Swansea it is united by rail. It is about 10 miles from Swansea by Loughor Ferry. It is irregularly built, but some of the houses are tolerably good. The parish church is an irregular edifice with two steeples, one terminated by a spire, the other by an embattled turret. There are several places of worship for dissenters, and good schools, some of which are free. Llanelly is a flourishing place, as an increasing trade, and four good docks. The Cambrian Copper Works and some collieries near the town employ a large number of the inhabitants; there are also lead, iron, and tin works, and a pottery. The chief article of export is coal, and large quantities of copper, for smelting, are imported. The population in 1881 was 12,655.

LLANGOLLEN, a town of Wales, in the county and 19 miles S.E. of Denbigh, on the south bank of the river Dee, at a distance of 20 $\frac{1}{2}$ miles from London by the Great Western Railway. The vale of Llan Gollen is interesting

from its picturesque beauty and its antiquarian remains, and is much resorted to by tourists, especially since the opening of the railway. The town has in consequence been much improved, and many good houses and shops built. The parish church was restored and enlarged in 1865. There is another church and several dissenting chapels; a town-hall, including market-house and assembly-rooms, erected in 1866; and a handsome court-house, built in 1867. Small manufactures of flannel and cloth are carried on, and there are some well-known ale breweries. The bridge was built by John Trevor, bishop of St. Asaph, who died in 1357; it consists of five arches, the widest not having more than 28 feet span. The river usually runs under only one arch, beneath which it has worn a deep channel in the hard rock which forms its bed. About a mile from Llangollen, situated on a high and steep conical hill, are the ruins of the castle of Dinas Bran, once a fortress of considerable strength; and about a mile beyond, nearly in the same direction, are the majestic remains of Vale Crucis Abbey, still in tolerable preservation: the name of this abbey is derived from a pillar or cross, situated in an adjoining field, supposed to be of high antiquity. Four miles from the town, and in another direction, is the Cysylltau aqueduct, by which the Ellesmere Canal is conveyed across the Dee, a noble structure of nineteen arches, raised 126 feet above the river. The population of Llangollen in 1881 was 3121.

LLANID LOES, a town of Wales, in the county and 18 miles N.W. of Montgomery, situated in a valley on the east bank of the Severn (crossed here by a handsome stone bridge of three arches), 37 miles W.S.W. of Shrewsbury, 158 W.N.W. of London, and 232 by London and North-western Railway. A town-hall stands nearly in the centre of the town. The church, built in 1542 on the site of an older structure, is chiefly remarkable for a ceiling of delicately carved oak, and for a square tower of great antiquity. There are fulling-mills, wool-carding and spinning factories, a brass foundry, and in the vicinity lead and copper mines. The population of the town in 1881 was 3121.

LLOYD'S, a name given to a set of offices on the first floor of the Royal Exchange, London, which is the great centre for all relating to shipping and marine insurance. The name arose from the fact that the first voluntary association of underwriters was at Mr. Edward Lloyd's private coffee-house in Tower Street. It was in the reign of Charles II. that this gentleman, noting the loss of time which arose to the mercantile community from the dispersion of the underwriters over different parts of the city, resolved to bring them together, to their advantage as well as his own. Accordingly, by various means, he contrived to make his coffee-house their rallying point, being aided in this by the fact that his house lay nearer than Garraway's or any of his rivals to such places as the Custom House, the Navy Office, and the Trinity House, as well as to the Thames "below bridge;" added to which the Tower Street ward numbered among its inhabitants a large infusion of the descendants of those foreigners who had first practised marine insurance in London, the Hansatics and Lombards. Mr. Lloyd presently removed nearer the Exchange, and his coffee house was long recognized as the London centre of marine insurance business. Under the influence of Mr. John Julius Angerstein the underwriters became gradually leagued together in a bond of membership, and Lloyd's became the great marine registry and insurance institution of the country. It has now grown into a vast organization, transacting an insurance business to the amount of more than £200,000,000 annually. The offices of Lloyd's are magnificent; the subscribers' room for the business of underwriting is 100 feet long by 48 wide, and communicates with a large library and reading-room. These contain a valuable collection of maps and charts, and instruments of navigation. There is also a captains' room, where

ships are sold and captains and owners meet for business; a commercial club-room, board-room, and clerks' offices.

The society of Lloyd's is managed by a committee selected from the members, and the expenses are defrayed by fees and annual subscriptions. None but those who have paid the fees are allowed to transact business there as insurance brokers or underwriters. Every day is registered a list of all vessels arrived or departed, all casualties at sea, and shipping intelligence from every part of the world, which is distributed over the country every evening by the publication of *Lloyd's List*, a paper first brought out in 1692 by Mr. Lloyd under the title of *Lloyd's News*. No newspaper was then in existence, with the exception of the *London Gazette*; and in 1696 *Lloyd's News* was suppressed by government on the ground that the liberty of printing did not extend to gazettes. The suppression lasted for twenty years. *Lloyd's List* has recently been added to the *Shipping and Mercantile Gazette*, published daily.

There is now scarcely a port in the world without an agent of Lloyd's, who gives the earliest possible information of all shipping movements. "*Lloyd's Register of British and Foreign Shipping*" is published annually, and contains an accurate classification of the mercantile marine of the kingdom, and this increases, in its information as to foreign vessels, yachts, dry docks, &c., with each year's issue.

This information is supplied by paid surveyors at each of the ports of the United Kingdom and at numerous foreign ports. The committee of Lloyd's also give rewards to those captains and others who render services to ships in distress. ("The History of Lloyd's and Marine Insurance," by Frederick Martin, London, 1876.)

LLOYD'S, AUSTRIAN, an association in some respects similar to Lloyd's, but intended also for general, commercial, and industrial purposes. It was founded by Baron Bruck at Trieste in 1833, and has at its command a fleet of steamers, by means of which it has established regular communication between Trieste and the Levant, carrying the Austrian mails.

LO, ST., the capital of the French department of La Manche, is situated 157 miles west from Paris, has civil and commercial tribunals, a college, and had 8900 inhabitants in 1881. The central part of the town stands on a rocky eminence above the Vire, from which the other streets, all irregularly and badly built, extend down the slopes in all directions. The square called Champ-de-Mars is prettily laid out with avenues of trees. The most remarkable structures are the church of Notre Dame, in which are fine painted windows, the gift of Louis XI.; the church of Sainte Croix, the best preserved edifice in the oldest Norman style in France; the church of St. Thomas, which is now a corn market; and the tower in the garden of the prefecture, which is all that remains of the former defences of the town. The chief manufactures of St. Lô are drugget, woollen yarn, tape, lace, linen, and leather. There is a considerable trade in horses for the French cavalry, in cattle, corn, small wares, cloth, &c. The town has a museum, dye-houses, and bleaching establishments.

LOACH is the name of some small fishes belonging to the CARP family (Cyprinidae), and forming for Günther a sub-family, Cobitidina. The loaches have a more or less compressed elongated body, which is sometimes naked or covered with very small scales. The mouth is surrounded with six or more barbels. The dorsal and anal fins are short. The air-bladder is partly or entirely inclosed in a long capsule formed by the anterior vertebrae. The pharyngeal teeth are in a single series. The common English Loach (*Nemachilus barbatulus*) is 3 or 4 inches long, having the body covered with small slimy scales, six barbels, and the ventral fins placed far back under the single small dorsal. The back and sides of the body are marked with dark

brown. It is widely spread over Europe, but is not found in Denmark or Scandinavia. The loach feeds exclusively on worms, the larvæ of insects, and other animal substances. It frequents brooks and shallow, rapid streams, where it delights to hide itself under the stones. Like other species of loaches it is peculiarly restless in stormy weather, usually rising to the surface. Its flesh is considered a great delicacy. It spawns in March or April. All the members of this group are remarkable for using the alimentary canal as a supplementary respiratory organ. The fish comes to the surface and swallows atmospheric air, from which it extracts the oxygen and discharges the carbonic acid by the vent. About fifty species of the genus *Nemachilus* are known from Europe and the temperate regions of Asia.

The Lake Loach (*Misgurnus fossilis*) belongs to the genus *Misgurnus*, which has ten or twelve barbels. It attains a length of about 10 inches. It is found in stagnant waters in some parts of Germany and Northern Asia. Three other species of this genus are known.

The Spinous Loach (*Cobitis tonia*) is very rare, and local in England, and is unknown in Ireland. It is distinguished by having a small erectile bled spine below the eye. It has six small barbels on the upper jaw. It is about 3 inches in length, having a row of large brown spots along the side, and being whitish beneath. It is not so much esteemed for food as the common loach.

The genus *Butia* is remarkable for having the air-bladder divided into two portions, the posterior of which floats freely in the abdominal cavity. The suborbital bone bears an erectile bled spine. The dorsal fin is placed in advance of the ventrals. This genus is mainly tropical, and the majority of the species have assumed a brilliant coloration. Other genera of loaches have been described from India.

LOAM, a soil compounded of various earths, of which the chief are silicious sand, clay, and carbonate of lime, or chalk. The other substances which are occasionally found in loams, such as iron, magnesia, and various salts, are seldom in such proportions as materially to alter their nature. Decayed vegetable and animal matter, in the form of humus, is often found in loams in considerable quantities, and the soil is fertile in proportion.

LOAN'DA, an island and province of the Portuguese possession of Angola. The island, which is a narrow stretch of sand, forms a protection to the bay, on which stands the town of

LOANDA, or as it is called in full Sao Paulo de Loanda, the chief town of the Portuguese possessions on the west coast of Africa. It is situated in 8° 48' S. lat., and 13° 71' E. lon., and is exceedingly deficient in its water supply and in its drainage arrangements. The chief buildings stand on an elevated sandy cliff which backs the town; they include government offices, the governor's and the bishop's palaces, and a good hospital, opened in 1881. Notwithstanding the unwise system of the Portuguese trade regulations, and the fact that the harbour of Loanda is rapidly silting up, and vessels are compelled to anchor 3 or 4 miles out, the trade of the colony is increasing. The colony produces ground-nuts, the mandioca plant, the sugar-cane, which is used for making rum, palm oil, the india-rubber tree, the cotton plant, the coffee and the tobacco plant. The natives smoke the leaves of a plant which they call Liamba. It is highly narcotic and stupefying, the inveterate smoker becoming idiotic and useless in a very few years; its action is much more violent than that of opium.

The climate of Angola is very changeable, generally hot and damp. There are two seasons, winter and summer, or the healthy and sickly seasons. The former is considered to be from June to September; it is termed the "Cacimbo," which signifies cool weather. During this period the atmosphere is quite clear from about ten o'clock in the

morning until sunset, the heat seldom exceeding 88° Fahr. From October to June the heat is intense; the medium temperature is then from 120° to 130° Fahr. In March and April heavy rains fall, and in October light showers; they are succeeded by close foggy weather, during which the land appears enveloped in vapour occasioned by exhalation from the humid soil; this is justly considered the most pernicious season, ague, dysentery, and inflammatory diseases—especially what is called "Carneirada," which is so fatal to Europeans—becoming prevalent; in fact, the whole atmosphere is impregnated with deleterious matter generated by decaying vegetation. The last census taken in 1881 gave the population of Loanda at 13,576, included in this number being 1470 whites and 721 convicts from Lisbon.

LOANGO, a country, west coast of Africa, under native chiefs, north of Congo, extending along the Atlantic for about 5 degrees. The limits are not well defined, but seem to embrace all the country from Cape Lopez and the mouth of the Ogoai to the mouth of the Congo or Zaire. The other chief rivers are the Benbo, Settee, and the Loango.

A great part of the country is covered with thick woods, which abound in game, and it is only mountainous in the interior towards the south. In the north it possesses some lakes of considerable extent, from which, and from the mountains, many rivers descend to the sea. The climate is excellent and the soil is rich, producing potatoes, gum, enormous sugar-canes, palms, manioc, maize, and a pulse called *mananga*. The wild animals are tiger-cats, ouncos, and hyaenas.

The natives are a fair-sized and well-built race, but exceedingly superstitious and submissive to their priests. It is a custom with them to place the marriageable maidens on view in front of their parents' houses. Loango, situated on Loango Bay, is simply a trading station.

LOASEÆ is a small and unimportant order of plants allied to the Passion Flowers. They are natives of America, from Texas to Chile, except one genus, which is found in Africa and Arabia. Only one species is made use of, namely, *Meutzelia hispida*, which is a strong purgative, and is employed by the Mexicans in syphilitic affections. The order agrees in a general way with those included in the cohort Passiflorales, belonging to the Polypetales, but special characteristics are the following:—Flowers, hermaphrodite; petals, dissimilar from the sepals; stamens, numerous, the inner ones sterile; ovary, inferior. The species are erect or climbing herbs, usually covered with stiff hairs, which are sometimes stinging. The leaves are without stipules.

LOBELIEÆ, a tribe of the order CAMPANULACEÆ. The species principally inhabit the warmer parts of the world. They abound in a milky juice, which in all is acid, and in some so intensely so as to produce dangerous or even fatal consequences when applied to the surface of the body or taken internally. Among the most violent is the *Jatropha longiflora*, a West Indian species, and the *Lobelia Tupa*, a Chilian plant now common in gardens. Certain species, however, have proved, in skilful hands, valuable curative agents, especially the *Lobelia inflata*, or Indian tobacco, which is an annual plant, growing in most districts of North America, of which the oval obtuse leaves are used in medicine. The action on the human system is nearly the same as that of tobacco when chewed, producing a copious flow of saliva, and if swallowed in a considerable dose, causing great relaxation of all muscular structures, including the heart and arteries, accompanied with debility and cold perspirations, and also paleness of the surface. In large doses it proves decidedly poisonous. It frequently acts as an emetic and expectorant when given in small and regulated doses.

LOBSTER (*Homarus vulgaris*) is a well-known crustacean belonging to the order Decapoda. The lobster is very closely allied to the Crayfish (*Astacus fluvialilis*), differing from it only in a few minor characters, such as in having the rostrum in front of the carapace furnished with spines, and the last segment of the thorax immovably attached to the preceding one. The general structure of the lobster has already been described in the articles CRAYFISH, DECAPODA, and CRUSTACEA. When full-grown the lobster weighs as much as from 8 to 12 lbs. The shell is bluish-black in colour, with various spots and blotches; but as is also the case with the crayfish, it turns red upon being boiled. This is owing to the action of water at 212° Fahr. upon the bluish-black pigment secreted by the epidermis, and diffused over the tegumentary armour. Alcohol, ether, and the acids also produce the same effect.

The lobster periodically moults its shelly armour, not only the plates, but the covering of the eyes, the lining membrane of the stomach, the teeth connected with it, and also the calcareo-tendinous expansions to which the muscles of the claws are attached. Released from its encasement the soft body suddenly pushes forth its growth, and shortly acquires a new coat of armour. When arrived at maturity the lobster no more casts its shell, the operation being connected with its growth.

Another curious circumstance connected with the lobster is that it possesses the power of reproducing its limbs when lost by accident. The loss of a leg is of little importance; nay, when suddenly alarmed a lobster will frequently throw off its claws with a sudden jerk, nor does it appear to suffer any pain. In a little time a new claw or leg begins to shoot, but it remains unprotected by a shell till the next general moult, and never attains the size of its fellow.

The great pincers or *chela* are well developed, one being larger than the other. The tail or abdomen is large, the segments being well developed and of nearly equal size. The last pair of appendages, together with the telson,



The Common Lobster.

form a powerful tail-fin. The other abdominal segments bear small appendages called swimmerets, although they have no natatory function. In the female these abdominal appendages serve for the attachment of the eggs, which are thus borne about until they are hatched. The young for some time continue to take shelter under their mother's abdomen. Lobsters do not pass through such complete metamorphoses as some shrimps and crabs. The appendages of the abdomen are the last to appear, and the eyes are for some time sessile. The lobster is highly esteemed for the table; when the female is in "berry"—i.e. full of eggs—it is in the best condition for food, but while the shell is being cast it is considered only fit for bait.

The common lobster is found in abundance along most

of the rocky coasts of this kingdom, where it is captured in traps or "pots," as they are technically called, made of wicker, on the principle of a wire mouse-trap, and baited with garbage. These are lowered into the water, and marked by means of floating buoys; sometimes nets are used. The lobster is voracious, active, and vigilant, and is more alert in warm weather than in cold. These crustaceans can run nimbly upon their legs. In their native element their movements are very rapid, and when alarmed they strike the tail smartly upon the chest, and thus propel themselves, as it were, backwards with a single sweep, swift as an arrow, to the distance of 30 or 40 feet. When closely pursued the lobster retreats among the rocks, and gains an asylum with remarkable dexterity, forcing itself through defiles and into holes which seem scarcely capable of admitting its body.

For many years lobsters have annually become smaller—in twenty-five years the average size has decreased from 8 to 4½ inches—and fishermen have had to proceed to greater distances to capture them. So serious, indeed, had matters become that in 1876 a royal commission was appointed to inquire into the cause and endeavour to find a remedy. The real cause, undoubtedly, was that for a long time lobsters had been overfished, neither age nor sex being respected. By the 40 & 41 Vict. cap. 42, passed in 1877, it was enacted that no person should take or sell any lobster which measures less than 8 inches from the tip of the beak to the end of the tail. The Board of Trade may also, after inquiry and notice, issue special regulations restricting; or prohibiting the fishing for crabs and lobsters.

The Common Lobster of the United States (*Homarus americanus*) is larger, with bigger claws, but in other respects almost identical with the European species. The Norway Lobster (*Nephrops norvegicus*) occurs on British coasts as well as on those of Norway, and extends into the Mediterranean. The body of the Norway lobster is long and cylindrical, and of a pale flesh colour with darker markings. The great claws are long, slender, and spiny. The eyes are large and kidney-shaped. The Spiny Lobster or Sea Crayfish (*Palinurus vulgaris*) is tolerably common on the rocky coasts of Britain, especially in the English Channel. It is esteemed for food, but is considered inferior to the common lobster; both Greeks and Romans used it as food, and it was known to the latter as *locusta*. The spiny lobster attains a length of about 18 inches. The carapace is thickly covered with spines, the antennæ are twice the length of the body, and the *chela* are very small.

LOB-WORM. See LUG-WORM.

LOCAL ANÆSTHESIA, in surgery. The parts operated upon are rendered insensible to pain by the spray of rectified sulphuric ether. The ether employed for this purpose is called *Anæsthetic Ether*; it has a specific gravity of 0.720 (60° Fahr.) The ethereal spray is developed by a hand-bellows, and is projected upon the skin through a fine jet. The parts subjected to the influence of the spray become, in less than a minute, perfectly blanched and deprived of sensation through the refrigerating effects of the ether. It is well known that chloroform renders the whole system insensible to pain, the patient being quite unconscious. By local anæsthesia, on the other hand, the sensibility of a part can be temporarily destroyed without sacrificing the consciousness of the individual. Moreover, one great objection to the employment of chloroform is the serious risk attending its administration; in certain organic diseases it cannot be used with safety, and may indeed be contra-indicated altogether. From local anæsthesia no fatal effects or bad consequences are likely to follow; and there is every probability that, although it will never supersede chloroform altogether, it will be used as a substitute in many of the minor operations of surgery. Many operations have already been performed under the influence of local

anæsthesia with the most satisfactory and gratifying results. The local anæsthetic process not only annuls the pain of the surgeon's knife, but also in a great measure prevents the attendant hæmorrhage. Experience has shown that it does not impair the vitality of the tissues, or interfere with any process of repair which may subsequently be set up.

More recently a valuable local anæsthetic has been found in the hydrochlorate of cocaine, which has been used with gratifying success in ophthalmic surgery. A small quantity dropped upon the eyeball is said to so completely anæsthetize the organ as to enable a severe operation to be painlessly performed, and this without exercising any injurious effect. There are also many other uses for which this drug will be available if its powers stand the test of experiment, and its introduction will open up a new era in the annals of surgery. From some experiments made in the early part of 1885 by Dr. Ferrier of Paris, and reported to the Société de Chirurgie, it appears that the hydrochlorate of cocaine possesses similar powers to that of cocaine. This is a discovery of much importance, for the price of the hydrochlorate of cocaine at present is fifteen times as much as that of caffeine.

LOCAL GOVERNMENT BOARD. Under the old Poor Law Board the 15,000 separate jurisdictions which up to 1834 maintained their own poor were combined into 650 unions under boards of guardians, chiefly elective. Thus no department under the crown had so wide and so minute an acquaintance with local officers and local affairs as the Poor Law Board; and the commissioners, being in official relation with several thousands of guardians, magistrates, and paid officers, could very readily obtain accurate knowledge of the affairs and demands of every parish in England and Wales. The Poor Law organization consequently offered the most eligible means for supervising most of the imperial legislation the carrying out of which was intrusted to local authorities. In 1871, therefore, the designation of the Poor Law Board was changed to Local Government Board. Since that time this board has been charged with many and diverse functions, in addition to the administration of the Poor Laws. The three general heads of jurisdiction exercised are (1) the Poor Laws, (2) the Local Government and Sanitary Acts, and (3) the Laws relating to the Public Health. The second were formerly under the Home Office, and the third under the Privy Council. The three headings embrace nine or ten distinct subjects, such as appointment of poor-law and sanitary authorities, gas and water supply, and proceedings under the Vaccination, Turnpike Roads and Highway, and Adulteration Acts. The jurisdiction of the board embraces, including overseers of the poor, no less than 35,000 separate local authorities.

LOCK, a fastening by means of a movable bolt, which is projected by means of a key, and cannot be withdrawn or unfastened except by the application of a similar key. Locks possessing considerable merit have been found of very great antiquity. The earliest lock of which the construction is known is the Egyptian, which was used at least 4000 years ago, and is still common in that country and in many other parts of the East where European influence has not penetrated. Made of wood, it consists of an arrangement of movable pins in the upper part of the lock, which are so adjusted as to rest upon the top of the bolt when the door is opened, and to drop into corresponding holes in the upper side of the bolt whenever the bolt is thrown. The key is of very simple construction, and is merely a flat piece of wood, or of iron, fitted with a number of projecting pins, which correspond to those of the lock and serve to lift them, and thus enable the bolt to be moved by the key. Locks of this description are generally of large dimensions, the bolt of an ordinary street door lock being 14 or 15 inches long, and those of gates, quarters, and public buildings of correspondingly larger size. Hence the key is a

somewhat cumbrous affair, and an official who has charge of the key of a public institution is often followed in public by an attendant, who carries it upon his shoulder. An allusion to this practice is found in Isaiah xxii. 22. Such locks afford but little security, as the places of the pins can easily be found by pushing in a piece of wood covered with clay, and the depth can be found by experiment. In some of the rudest forms the lock might be picked by the fingers, a circumstance which explains the reference in Cant. v. 4. Another form of lock, the use of which dates from remote antiquity, is that known as the "ward lock," and this is still in very general use at the present day in Europe. Keys made for locks designed upon this principle have been found in the excavations made at Pompeii and Herculaneum, and the drawings in Plate marked fig. 1 are copies of keys found at those places which have been deposited in the British Museum. The essential feature of this lock consists of an arrangement of obstacles called *wards*, arranged round the centre, for preventing any but the proper key being turned in the lock for the purpose of throwing the bolt. During the middle ages much skill and ingenuity were displayed in the arrangement of these wards, and some of the locks which remain are marvels of intricate workmanship. During the eighteenth century a great improvement was made by the introduction of the single tumbler, a movable lever or small plate of metal, with a projecting pin, which is designed to fall into one or other of two notches cut on the upper side of the bolt, and prevents it being moved till the tumbler is raised by the key. In 1778 Robert Barron patented a lock with several tumblers, two being employed in the form he introduced to general use. In this lock both tumblers had to be raised to the proper height and no higher before the lock could be opened, and this feature in connection with an ingenious arrangement of wards designed to frustrate the use of skeleton keys, rendered his lock one of the most secure that was known. In 1790 Moses Lind patented a series of locks constructed on what is now recognized as the true lever principle, and may be regarded as the originator of the present form of the lever lock. In his specification he shows a key formed for lifting twelve levers. The modifications of this principle which have since been devised are too numerous to allow of special mention, and we can only give a description of their general principle.

Lever locks differ from all variations of the ward lock in the fact that instead of offering obstructions to the turning of a wrong key in the lock, they depend for their security on obstructing the passage of the bolt itself, unless the rightful key be used in the attempt to throw it. This object is attained by arranging a number of levers close to and parallel with the bolt. They consist generally of a series of plates with an up and down motion, working on and held together by a common pin. In each of these plates a passage or gating is cut, so as to allow a stump, or projection from the bolt, to pass through the gating only when the plates are raised to a certain given height. By varying the altitude of the passage or gating in each lever, and forming lifting steps in the key to correspond, a new and important principle of security is obtained. Fig. 3 shows a mortise lock for a room door, and has been selected for illustration as being one of the most complete of its kind. B is the bolt; T shows a series of levers with the open spaces, and the passages or gatings, through which the stump *t* passes. This stump may be seen in the open space to the left, retaining the bolt in the position of being locked; when the bolt is withdrawn, or in other words, the lock unlocked, this stump will be in the inner gating. C shows the position of the latching bolt with its bolt spring *s*, and *F* the follower (Hobbs & Co.'s patent) which actuates the bolt.

In 1784 Joseph Bramah, the celebrated engineer, patented an ingenious invention, which has become well known as

the Bramah lock. This was afterwards improved by Mr. Russell, one of Mr. Bramah's workmen, and the improvement was patented in 1817. The invention, in its present complete form, consists in the introduction of a series of slides, *ll*, fig. 2, radiating around the key-pin *p*, which slides may be regarded as a continuation or multiplication of the cleft portion of the ordinary key; only in this case such cleft portions, instead of being, as they might be, arranged around the key, are retained in the lock itself, and made to take their correct position with reference to the wards by the insertion of the key, the wards in this lock consisting simply of a series of studs or plates, *m*, around the circumference of the slides. Thus the "barrel" of the lock, namely, that portion which holds the slides, becomes, in fact, in its movement a portion of the key, and acts as one with it in throwing the bolt. Fig. 2 shows a section of a complete Bramah or slide lock, together with the key, in the shaft of which the cuts may be seen, to receive the slides of the lock. The spiral spring, *b*, serves to press the slides outwards except when they are forcibly depressed by the cuts in the key. As the patent has long ago expired locks upon this principle are now made by many makers, though they must not be called Bramah's locks. Their great merit is found in the difficulty they present to the lock-picking fraternity, and in the neatness of the form and small size of the key required. They are not, however, as is commonly supposed, invulnerable against lock-picking implements, and in the opinion of some makers they offer undue facilities to lock-breaking tools.

Among the improvements introduced into the manufacture of lever locks is that of the "detector," invented by Jeremiah Chubb, and patented by him in 1818. Its object was, in addition to preventing the bolt from being withdrawn by any but the proper key, to give notice to the owner of any attempt being made with a wrong or false key; hence the use of the word "detector." If the reader imagine a scale beam to be placed over the levers (shown at T, fig. 3) with clutch ends, to retain the levers should they be raised too high by a false key, an idea of this "detector" may be obtained. The "Chubb lock" of the present day contains the same detective movement, with many additional contrivances to give increased security. The principal of these are—first, serrated or notched gatings to the levers, similar to a plan described in Bramah's patent for 1817 as applied to his slides, and again in Strutt's patent of 1819 as applied to his "new-shaped tumbler or lever lock;" and secondly, the covering-curtain of the keyhole invented by De la Fons, and patented by him in 1846. Great credit is due to the eminent firm of Chubb and Son, who have done so much to introduce this lever lock to the public, and to bring it into more general use.

The next important step in the development of the lever lock was made by A. C. Hobbs, who in 1852 patented his celebrated "protector lock." This invention consists of an ingenious contrivance, the "movable stump," by which it is made impossible for anyone to put a pressure upon the levers, and so feel their way to the several gatings through which the bolt stump passes when the bolt is thrown; and it is now universally admitted to be an effectual security against picking. The form of the "protector" very much resembles a steelyard; it is placed at the back of the bolt, and the slightest pressure against the stump working between the gating is taken by the long arm of the protector, and thus frees the levers from the only means by which the position of their openings can be found by successive trials. This principle marks a new era in the history of locks, and has formed the foundation of many subsequent inventions for the purpose of rendering locks unpickable. Among such inventors may be mentioned Sir E. Beckett, Tucker, G. Price, and O'Connell. A still further advance was made by J. M. Haut, who in his patent of 1861 describes

a method of protecting the lock against any fraudulent attempts to cut away that portion of the bolt by which it is thrown, and thus delude the owner into fancying that he had secured his lock, when actually he had only turned the key round in the lock and lifted the levers without carrying the bolt to its destination. These two principles of protection against picking and against fraud are combined in the "patent protector locks," manufactured by Hobbs, Hart, & Co. An important development of Hobbs' "movable-stump" principle is also the invention of J. M. Hart, and patented by him in 1865. Its main feature consists in the multiplication and combination of movable and fixed stumps to such a number that the whole length of a door secured by it would require to be broken away before the lock could be effectually violated.

A valuable and ingenious lock, containing still further principles of security, was invented by Robert Newall, of New York. It is popularly known as "Hobbs' changeable lock," having been introduced by Hobbs into this country. The principle on which it is constructed is that, by an admirable mechanical contrivance, the levers adjust themselves in the act of locking to any arrangement of the key-steps by which it is locked; and however the relative positions of the steps of the key may be changed the levers take accurately a corresponding arrangement. By this means any person holding the key may vary it at pleasure, and thus virtually obtain a new lock as often as he pleases. This lock has since been considerably improved in the details of its construction, and, as now made, constitutes the highest attainment of mechanical art that has ever been reached in this department of industry and skill. Fig. 4 shows a complete lock of this description, with its key and movable bits. Practically it is found more convenient to have a number of solid key-heads or "webs" all fitting on the same handle, any one of which will shoot the bolt; but when once shot, it can only be withdrawn by the particular key which locked it. As it has been calculated that a lock with nine levers, each raisable to seven different heights, may have over 40,000,000 different keys, it is obvious that the chances of a lock-picker hitting on the right combination are not great.

A very different class of lock has been introduced in the United States, which depends for its action on a watch or chronometer forming part of the mechanism. This watch has a dial with pins marked for every hour. Any number of these pins may be pulled out and the watch will let a weighted lever fall against the bolts of the lock during all these hours, thus effectually preventing the opening of the lock by anyone except at certain fixed hours, which may be varied from time to time. The value of such a contrivance in the case of such locks as those of bank-safes, &c., which are shut all night, need hardly be pointed out.

Locks that are actuated without keys are known as puzzle or letter locks. They are sometimes regarded rather as an ingenious toy than as an available substitute for the more usually constructed locks, but under certain exceptional circumstances, when multiplication of keys is inadmissible, a lock of this kind is a valuable protection. Fig. 5 represents this particular lock.

LOCK, MATTHEW, the musical composer, was born at Exeter, and brought up as a chorister in the cathedral of that city. We have no particulars of his life earlier than the year 1653, when he composed the music to Shirley's masque of "Cupid and Death." He was next employed to compose the music for the public entry of Charles II. at the Restoration, and was soon afterwards appointed composer-in-ordinary to the king. In the latter part of his life he became a Roman Catholic, and was appointed organist to Queen Catherine of Portugal, the consort of Charles II., who was permitted the exercise of her religion, and had a chapel with a regular establishment at Somerset House. Lock died in 1677. The music of the English stage owes

much to the genius of this musician. When musical dramas were first attempted—which Dryden styles "heroic plays" and "dramatic operas"—Lock was employed to set several of them. The first of these, "The Tempest," was given to the public in 1673, and in the same year "Psyche," dedicated to James, duke of Monmouth. There is a preface of some length by the composer, which, like his music, is rough and nervous, exactly corresponding to the idea which one is led to form of his private character by the sight of his portrait in the music school at Oxford. The musical world is indebted to Lock for the first rules ever published in England for thorough-bass, in a book entitled "Melothesia" (1673). It is dedicated to Roger L'Estrange, Esq., afterwards Sir Roger. The "rude and wild excellence" of the famous music to "Macbeth" is a constant theme of admiration by musical critics and historians, and from the long contest over the authorship of this composition, which has borne his name for so many years, Lock is now admitted to have emerged victorious. Leveridge's claim was founded on a misapprehension [see LEVERIDGE], and Purcell's claim, which rested on a manuscript some known to be in Purcell's handwriting, falls before the logic of dates, for the celebrated "Lock's music" was performed when Purcell was a lad of fourteen. Purcell no doubt admired its dramatic force, and copied it as a model for his early studies. The music is still highly popular, but is not so much heard on the stage as formerly, since most of it is written to a rhymed non-Shaksperian text, which jars with the incomparable beauty of the tragedy itself.

LOCKE, JOHN, was born at Wrington, near Bristol, on the 29th August, 1632. He was first placed at Westminster School, from which he was elected in 1651 to Christ Church, Oxford. In his later days of fame a portrait of him was commissioned from Lely for the great hall of the college, where it still hangs, a wonderfully fine piece of painting. He applied himself at that university with great diligence to the study of classical literature, and by the private reading of the works of Bacon and Descartes sought to acquire that alimient for his philosophical spirit which the Aristotelian scholastic philosophy, as taught in the schools of Oxford, did not afford. He adopted the profession of medicine, which, however, the weakness of his constitution prevented him from practising.

In 1661 Locke visited Berlin as secretary to Sir W. Swan, envoy to the Elector of Brandenburg; but after a year he returned to Oxford, where he accidentally formed the acquaintance of Lord Ashley, afterwards Earl of Shaftesbury, and accepted his invitation to reside in his house. Here he became acquainted with some of the most eminent men of the day, and was introduced to the Earl of Northumberland, whom, in 1668, he accompanied on a tour into France. Upon the death of the earl he returned to England, where he again found a home in the house of Lord Ashley, who was then chancellor of the exchequer, and Locke was employed to draw up a constitution for the government of Carolina, which province had been granted by Charles II. to Lord Ashley with seven others.

In 1672, when Ashley was created Earl of Shaftesbury and made lord chancellor, Locke was appointed secretary of presentations. This situation he held until Shaftesbury resigned the great seal, when he exchanged it for that of secretary to the Board of Trade, of which the earl was still president.

In 1674 Locke visited France, and resided at Montpellier. In 1679 he was recalled to England by the Earl of Shaftesbury, who had been restored to favour and appointed president of the council. Six months afterwards, however, when the earl was again disgraced, and was ultimately compelled to leave England (1682) to avoid a prosecution for high treason, Locke followed him to Holland, where, even after his patron's death, he continued to reside; for the hostility of the court had been transferred to Locke,

and his name was erased, by royal mandate of the 16th of November, 1684, from the number of the students of Christ Church. During his residence in Holland he had commenced, in 1675, his "Essay concerning Human Understanding," which he completed in 1687. On the revolution of 1688, Locke returned to England in the fleet which conveyed the Princess of Orange. He now obtained, through the interest of Lord Mordaunt, the situation of commissioner of appeals, with a salary of £200 a year. In 1690 his reputation as a philosophical writer was established by the publication of his "Essay concerning Human Understanding," which met with a warm reception. Numerous editions passed rapidly through the press, and translations were made of it into Latin and French. In the same year Locke published two treatises on "Civil Government." These essays were intended generally to answer the partisans of the exiled king, who called the existing government a usurpation, but particularly to refute the principles advanced in the "Patriarcha" of Sir Robert Filmer. In the second essay Locke maintains that the legitimacy of a government depends solely and ultimately on the popular sanction, or the consent of men making use of their reason to unite together into a society or societies. The philosophical basis of this treatise formed a model for the "Contrat Social" of Rousseau. (The "Patriarcha" and Locke's "Answer" are one of the volumes of Morley's Shilling Library—appearing in this cheap form in 1881.)

The air of London disagreeing with Locke, he accepted the offer of apartments in the house of his friend, Sir Francis Mordaunt, at Oates in Essex. In this retirement he wrote a third letter on "Toleration," which called forth a reply from a former antagonist of Locke's on the subject; in answer to whom a fourth letter, in an unfinished state, was published after its author's death. In 1693 he first gave to the world his "Thoughts upon Education," to which Rousseau was very largely indebted for his "Emile." Though appointed one of the commissioners of trade and plantations in 1695, he still found leisure for composition, and he was principally engaged in writing on Christianity. His health soon became so impaired that he resigned his office of commissioner of trade and plantations, refusing a pension which was offered him. From the time of his retirement he resided at Oates, and devoted the remainder of his life to the study of the Holy Scriptures. He died on the 28th of October, 1704, in the seventy-third year of his age.

The personal character of Locke was in complete harmony with the opinions which he so zealously and so ably advocated. Truly attached to the cause of liberty, he was also willing to suffer for it. Perfectly disinterested, and without any personal object at stake in the political views which he adopted, he never deviated from moderation; and the sincerity of his own profession rendered him tolerant of what he believed to be the conscientious sentiments of others.

A more durable or a wider influence than that still exerted by John Locke can hardly be imagined. The course he pre-cribed two centuries ago has been followed. Education has been released from a mechanical groove of tuition; the teaching power of our universities is unshackled; relief of the poor no longer directly encourages sloth; our monetary system rests on a sound basis; our parliamentary representation has been remodelled; persecution on the ground of religious tenets is no more; and, to pass from the domain of practical life to the life intellectual, Locke, as a leader in mental philosophy, still largely controls the issues of thought.

Philosophy of Locke.—The "Essay concerning Human Understanding," Locke's most celebrated work, and on the whole the most influential treatise in modern philosophical literature, is the first comprehensive criticism, by the inductive method, of the nature and limits of human knowledge. Its fundamental doctrine forms a broad foundation

for that free exercise of individual judgment, which it was the great aim of its author to vindicate in his public and literary life. The problem of this immortal work is essentially that proposed afterwards in Kant's "Critique of Pure Reason;" and the opening polemic against innate principles is virtually an effort to dispossess the strongholds of prejudice, and to remove the veil of error. The "Essay" was in preparation, at intervals, for twenty years, and the first rough draft in MS. is dated in 1671. It was finished in MS. in 1686, the year in which Newton's "Principia" was finished. The French abridgment, which appeared in Le Clerc's "Bibliothèque Universelle," in January, 1688, raised a general desire for the work itself, which Locke accordingly put to press soon after his return to England. The philosophy of the "Essay" is founded on the negation of innate principles and of a continuous consciousness in man. Its parts are regulated by the aim of the author to determine, on the Baconian method, our intellectual power and weakness, with the nature and grounds of knowledge and opinion. Having reasoned against the dogma of innate knowledge, independent of experience, maintained in the ancient schools of Pythagoras and Plato, and not alien, in a modified form, from Descartes and Lord Herbert, Locke in his second book propounds his own hypothesis, and endeavours to test it by an inductive comparison of our ideas. His thesis is that human knowledge may be resolved into external and internal experience, which he vindicates by what Bacon would call the crucial instances of our ideas of space, time, infinity, substance, power, identity, and others apparently the most remote, from an empirical origin. On this foundation rest the speculations of the fourth book, on demonstration and belief, and on the grounds of physical, psychological, and theological science. The popular and inexact style of the "Essay," which announced the man of the world rather than the schoolman, has made the interpretation of it the riddle of subsequent philosophical exegesis. Among many other words, the leading terms *idea* and *experience* have puzzled generations of readers. Locke himself distinctly says that he employs *idea* as synonymous with *notion*; and classes ideas into *modes*, *substances*, and *relations*. Indeed he frequently uses the word in almost as wide a sense as thought. The point is touched upon with some completeness in the article *IDEA*. All ideas, according to Locke, are acquired through *experience*: the soul has no ideas to start with; it, says he, like a piece of blank paper. Experience is a term used by him as vaguely as *idea*, for he covers by it all sensation and all reflection, the operations of the senses and those of the intellect. It is evident that Locke never had a glimmering of the glorious light thrown upon the origin of knowledge by the doctrine of *HEREDITY*. The "Essay" has been quoted by the most opposite schools. Locke, like Socrates, has moved philosophical thought in the most opposite directions, to the most various results; while both Socrates in Greece and Locke in Europe, by their earnest and unsystematic discourse, have aroused the two most powerful manifestations of reflection which the world has yet seen. It must indeed be owned that the sympathies of the English philosopher were more with ordinary happiness, the prudential virtues, and the methods and spirit of experimental research, than with those loftier faculties and aspirations which he was apt to associate with mysticism. Very soon after its publication the "Essay" excited much attention. The author himself prepared six editions for the press, in the course of which he introduced many minor changes and added some chapters. The book raised a storm of opposition, which raged somewhat fiercely among the scholars of the time, who, all in turn, and on various grounds, charged the "Essay" with unsound philosophy and dangerous consequences. Locke's most celebrated adversary was Stillingfleet, bishop of Worcester. In 1696 Toland had published his "Christianity

not Mysterious," in which he sought to prove that the Bible contains nothing above reason. He drew several of his arguments from the "Essay" of Locke. A similar doctrine was maintained in some Unitarian treatises published about that time. Stillingfleet, defending the mysteries of the Trinity against Toland and the Unitarians, condemned some of Locke's principles as heretical, and classed his works with those of the heretical writers. Locke answered the bishop, who replied the same year. This reply was met by a second letter of Locke's, which drew a second answer from the bishop in 1698. Locke again replied in a third letter, in which he proved the harmony of his philosophy with Christianity, and maintained that he had advanced nothing which had the least tendency to scepticism, as was alleged in the misrepresentations of Stillingfleet, whose death in the following year ended the controversy. This discussion was managed by Locke with extraordinary skill, and in no part of his writings is there a greater display of acuteness and masterly employment of language. Stillingfleet was better fitted for ecclesiastical than philosophical disputation, and was no match for the antagonist he had evoked. The subsequent history of the criticisms and controversies occasioned by Locke's "Essay" is in some sort the history of metaphysical philosophy during the last 150 years. Hume, D. Stewart and Macintosh, Coleridge and Hamilton, are among the most illustrious later critics of the "Essay." In France Condillac and Cousin, coinciding in their interpretation of his works, have ranged themselves and their respective schools as the disciples and the adversaries of the English philosopher. In Germany the "Essay" of Locke gave birth to the "Nouveaux Essais" of Leibnitz, his psychological masterpiece, prepared by him a few years after the appearance of the "Essay," though it remained unpublished till 1765; and the metaphysic of Kant was meant to be a modification and supplement of the metaphysic of Locke.

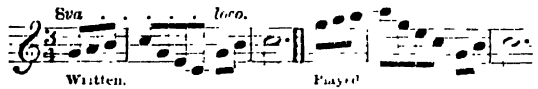
Had Locke not been so pre-eminent as a mental philosopher we should regard more highly his very valuable contributions to education. As it is, the grandeur of the "Essay" overshadows the great excellence of the "Thoughts on Education." These have the additional merit of being based on real experience.

LOCKHART, JOHN GIBSON, a British author, was born in the manse of Cambusnethan, in Lanark, in 1791, where his father, Dr. Lockhart, was minister. In 1796 his father was transferred to Glasgow, where John Lockhart was educated at the High School. Such was his early progress in scholastic studies, that at the age of fourteen he received the Snell exhibition to Balliol College, Oxford. He took first-class honours there in 1813, and in 1816 was called to the Scottish bar. As a pleader he failed; but in 1817 he joined the staff of *Blackwood's Magazine*, and in addition to a large number of essays dealing with literary matters, criticisms, reviews, and translations, he contributed largely to the sharp and bitter political controversy which then divided Edinburgh. In 1818 he made the acquaintance of Sir Walter Scott, whose eldest daughter Sophia he married in 1820. For the next five years he resided partly in Edinburgh and partly at Chiefswood, a cottage within easy distance of Abbotsford. In 1821 he published his first novel, entitled "Valerius, a Roman Story," which was followed by "Adam Blair" in 1822, "Reginald Dalton" and "Ancient Spanish Ballads" in 1823. In 1826, on the death of Mr. Gifford, he was appointed editor of the *Quarterly Review*, which he conducted with great learning and ability for a period of twenty-eight years. In 1828 he wrote for *Constable's Miscellany* a charming biography of the poet Burns, which was afterwards published separately, and which has passed through several editions. On the death of Sir Walter Scott (in 1832), Lockhart was selected as his biographer, and the task proved to be a labour of love, which he carried to a most successful

issue. The "Life of Walter Scott" was completed in seven vols., the first of which was issued in 1837, and the last in 1839. In 1853 he was compelled, by declining health, to resign the editorship of the *Quarterly*, and he died 25th November, 1854, at Abbotsford. Some interesting details of his character and genius will be found in Mrs. Gordon's "Life of Professor Wilson."

LOCK-JAW. See TETANUS.

LO'CO (Ital., in place), the recognized contradiction in music of a previous direction to play or sing—by way of avoiding unnecessary use of ledger-lines, &c.—an octave (or two octaves) above or below the written pitch of the notes.



LOCOMOTIVE STEAM ENGINE, or LOCOMOTIVE, a machine consisting essentially of a carriage, on which are conveyed a steam boiler and a non-condensing steam-engine; the engine serving to drive one or more of the wheels of the carriage, so as to enable it to move from place to place, and also to propel other carriages, usually by dragging, and sometimes by pushing. The stores of fuel and water may be carried either by the locomotive itself, or by a separate carriage called a *tender*. Locomotives are used chiefly on railways, and occasionally on common roads. The application of the steam-engine to locomotion on land was, according to Watt, suggested by Robison in 1759. The first actual locomotive engine appears to have been a steam carriage for use on common roads, invented by Cugnot, a French engineer, about 1763. It was made, and tried upon a short journey, in 1769, and in an improved form in 1770; but was abandoned on the ground of supposed danger. In 1769 and 1784 Watt took patents for the application of his steam-engine to locomotion; but those inventions were never carried into effect. In 1784 William Murdoch, assistant to Watt, made a very efficient working model of a locomotive engine. The first practically successful locomotive engine was that of Trevithick and Vivian, patented in 1802, and set to work in 1804. It was originally intended to travel on common roads, but failing in this was adapted to work on a colliery tramway, near Methyr Tydvil. It travelled at about 5 miles an hour with a net load of 10 tons.

After various inventors had long excited their ingenuity in vain to give the locomotive engine a firm hold of the track by means of roughened wheel-tires, rackwork rails, and toothed driving wheels, legs and feet, and other contrivances, William Hedley, in 1813, made the important discovery that no such aids are required, the adhesion between smooth wheels and smooth rails being sufficient, provided a sufficient weight was brought to bear on the driving wheels.

To adapt the locomotive engine to the great and widely varied speeds at which it now has to travel, and the varied loads which it now has to draw, two things are essential—that the rate of combustion of the fuel, the original source of the power of the engine, shall adjust itself to the work which the engine has to perform, and shall, when required, be capable of being increased to many times the rate at which fuel is burned in the furnace of a stationary engine of the same size; and that the surface through which heat is communicated from the burning fuel to the water shall be very large compared with the bulk of the boiler. The first of those objects is attained by the *blast-pipe*, invented and used by George Stephenson in 1814; the second, by the *multi-tubular boiler*, invented about 1828 by Séguin in France, and suggested by Mr. A. Booth to Stephenson, who was the first to combine those two all-important inventions, and adapt them to a form of engine and arrangement of mechanism suited to high speeds. On the

6th October, 1829, occurred that famous trial of locomotive engines, when the prize offered by the directors of the Liverpool and Manchester Railway was gained by Stephenson's engine the *Rocket*, the parent of the swift and powerful locomotives of the present day. The *Rocket*, and two of the other engines which competed on that occasion, Hackworth's *Sanspareil* and Braithwaite and Ericsson's *Norelty*, are preserved in the Patent Office Museum at South Kensington. These three engines are illustrated in Plate I. as a contrast to the powerful and massive machine into which the locomotive has developed in our day. The *Norelty* (fig. 1) weighed, empty, 2 tons 15 cwt., the *Sanspareil* (fig. 2) 4 tons 8½ cwt., and the *Rocket* (fig. 3) 4 tons 3 cwt. The latter was mounted on four wheels and had a cylindrical boiler 6 feet long and 3 feet 4 inches in diameter, which contained twenty-five copper tubes (shown in the cross section, fig. 4). The furnace or "fire-box," as it is now called, was at the rear of the engine. It measured 2 feet by 3 feet, and had an external casing forming part of the boiler, between which and the fire-box there was a space of 3 inches filled with water. The surface of the fire-box was 20 feet, and that of the flue-tubes was altogether 117½ feet. This engine attained a speed of 35 miles an hour without load, and 24 miles an hour drawing three times its own weight. Since that time the locomotive engine has been varied and improved in various details, and by various engineers. Its weight now ranges from 5 to 60 tons; its load from 50 to 500 tons; its speed from 10 to 70 miles an hour.

The hauling force of a locomotive engine is in general limited, not by the power which the engine is capable of exerting—for that is almost always more than sufficient to draw any load that it ever has to convey—but by the *adhesion*, as it is called, or force which prevents the driving wheels from slipping on the rails. The adhesion is equal to the weight which rests on the driving wheels, multiplied by a coefficient which depends on the condition of the surface of the rails; being greatest when they are clean and dry, and least when they are wet and greasy or covered with ice. On an average, the adhesion of a locomotive engine may be estimated at about one-seventh of the load on the driving wheels.

Locomotive engines are seldom made with fewer than six wheels. Those which are intended for the propulsion of comparatively light trains at high speeds may have but one pair of driving wheels of from 5 feet 6 inches to 7 feet 6 inches, and sometimes even 8 feet in diameter; but very often two driving wheels of equal diameter are coupled, as shown in fig. 5. For goods and mineral trains engines are used having all six wheels coupled, and usually of smaller diameter, such as 4½ or 4 feet, and in some cases of engines for ascending steep inclined planes, 3½ or 3 feet; and occasionally the wheels of the tender also are driven by steam power.

On Plate II. we give illustrations of the general appearance of the modern locomotive. Fig. 5 represents an express passenger engine with eight wheels, of which the first four are attached to what is called a *bogie* or small truck, turning on a pivot to enable it to adapt itself to curves. The diameter of the bogie wheels is 3 feet 6½ inches, and of the four other wheels, which are coupled together, so that all four act as driving wheels, 6 feet 0½ inch. The engine is constructed for the ordinary 4 feet 8½ inch gauge, and its weight in working order is 40 tons 10 cwt. The heating surface is—in fire-box, 105·75 square feet; in tubes, 1033·04 square feet. The cylinders are 18 inches in diameter, and of 26-inch stroke. It was constructed by Messrs. Dubs & Co. of Glasgow. Fig. 6 represents a goods locomotive constructed by the same firm, having six wheels coupled, all of 4 feet 10 inches diameter. The cylinders are 17½ inches in diameter and of 26-inch stroke. The heating

surface inside of fire-box is 119·52 square feet, and of tubes 1111·65 square feet. The weight of engine in working order is 35 tons 3 cwt.

In fig. 7 is represented the type of passenger locomotive chiefly used in America. It will be observed that the chimney is greatly widened at the top. This is rendered necessary by the system of covering it with wire-netting to prevent the escape of sparks, which are much more dangerous when the fuel used is wood instead of coal. The cylinders, as shown, are placed outside the smoke-box. In this example (a locomotive constructed for the 4 feet 8½ inch gauge) they are 17 inches diameter, and of 24-inch stroke. The heating surface is 112 square feet inside fire-box, and 942 square feet inside tubes. The diameter of the bogie wheels is 2 feet 4 inches, and of the other four (coupled) wheels 5 feet 3 inches. Total weight of engine in working order, 35 tons 12 cwt. 3 qrs.

In Plate III. we give, to illustrate the details of construction of a modern locomotive, a longitudinal section and plan of a bogie passenger locomotive, recently constructed by Messrs. Neilson & Co. of Glasgow. The heating surface in fire-box is 113 square feet, and in tubes 1095·6 square feet. The cylinders are of the inside description—that is, they are placed at the base of the "smoke-box," as shown in plan, and are 18 inches in diameter and of 26-inch stroke. The diameter of the bogie wheels is 3 feet 6 inches, and of the coupled driving wheels 6 feet 6 inches. For a general description of a locomotive boiler we must refer the reader to the article *BOILER*. It consists of two distinct parts, the fire-box and the barrel, the former containing the furnace or internal fire-box, a copper box almost entirely surrounded by water, and measuring in this instance 5 feet 4 inches by 4 feet 9 inches by 3 feet 6 inches, in the rear portion of the boiler; while the barrel, which contains the flue-tubes—226 in number—extends from the fire-box to the smoke-box, or space at the base of the chimney, into which these flue-tubes discharge the products of combustion. It measures 10 feet 7 inches in length, and 4 feet 4 inches in diameter. For this type of engine the supplies of fuel and water are carried by a separate carriage or tender, from which the water is injected into the boiler by means of a pair of force-pumps. Another type of engine, in which this additional carriage is dispensed with, is the tank-engine, shown in section and plan on Plate IV. It is so called from the water-tank, which almost surrounds the boiler. This engine, constructed by Messrs. Neilson & Co. for the London and South-western Railway, is mounted on ten wheels. The four leading wheels are attached to a bogie, and are 3 feet in diameter, the four (coupled) driving wheels are 5 feet 7 inches in diameter, and the two trailing wheels, which are fitted with sliding bearings which permit them to accommodate the position of the axle to curves of the line (somewhat in the same manner as the bogie), are 3 feet in diameter. The cylinders are 17½ inches in diameter, and have a 21-inch stroke. The heating surface is 111·18 square feet in fire-box and 944·75 in tubes, of which there are 201. The dimensions of the barrel are 10 feet by 4 feet 1 inch. The capacity of the side tanks is 550 gallons, and of the hind tank 650; space for fuel, 100 cubic feet.

The latest improvement in locomotive engines has been the attempt to introduce the system of separate high and low pressure cylinders, long used with marked advantages in stationary and marine engines. As the locomotive does not, however, admit of *condensing* the steam under the piston of the second cylinder, the conditions of the problem are materially different in its case, and consist mainly in utilizing the *expansive* power which may still remain in the steam as discharged from the high-pressure cylinder. The system introduced by Mr. F. W. Webb, of the London and

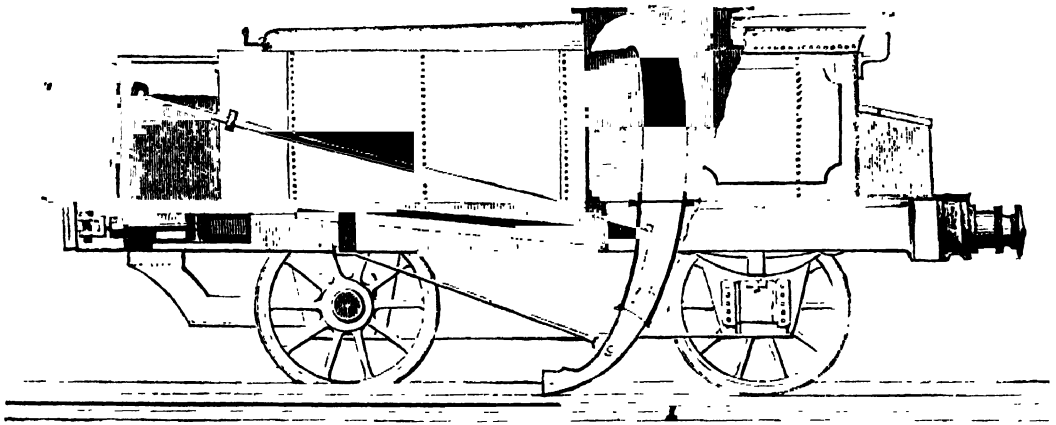
North-western Railway at Crewe, consists in placing the two high-pressure cylinders outside the framing, and introducing a third cylinder of double the capacity under the smoke-box, into which the exhaust from the other two cylinders is directed. The high-pressure cylinders are connected with one pair of driving-wheels, and the single low-pressure cylinder with another.

On the Continent, where a similar system had been introduced by M. Mallet, the two-cylinder type of engine was retained, one cylinder, however, being made much larger than the other, and the exhaust steam was passed from the smaller to the larger. Engines of similar type have been introduced in this country, but they necessitate special arrangements for starting the engine should the crank of the high-pressure cylinder stop on the "dead-point."

As an example of the most recent type of compound locomotive we give an illustration in Plate V. of the *Marchioness of Stafford*, a London and North-western express engine, designed by Mr. F. W. Webb, and exhibited at South Kensington in 1885. The engine has two high-pressure cylinders, 14 inches in diameter and of 24-inch stroke, attached to the outside frame-plates, between the middle and leading wheels, and the connecting-rods of these cylinders work the trailing-wheels. Between the main frames, under the smoke-box, is placed the one low-

pressure cylinder, 30 inches in diameter and of 24-inch stroke, its connecting-rod working the single crank of the middle pair of wheels. The driving-wheels are 6 feet 3 inches in diameter, and are *not* coupled. The steam is supplied to the high-pressure cylinders by two 3-inch copper pipes from the dome. The exhaust steam is returned to the low-pressure cylinder by two 5-inch pipes, passing through the smoke-box, and of capacity sufficient to act as steam receivers. The objects for which this type of engine was specially designed are economy of fuel, owing to greater adaptability of power to load, and the doing away with coupling-rods, while retaining the advantage of the weight in two pairs of driving wheels for adhesion. The commercial results attained are said to have been very satisfactory, and a large number of engines of similar type are now at work on the London and North-western Railway. The steam blast is of course affected by the reduction of the number of blasts per minute to half, but no difficulty has been found in raising sufficient steam, the long run from London to Carlisle having been accomplished well within time by this type of engine.

By an invention of Mr. Ramsbottom, shown in annexed cut, the tender of a locomotive is made to supply itself with water while in motion, through a tubular scoop which dips into a long water-trough lying between the rails. The



Ramsbottom's Feed-water Picking-up Apparatus.

speed should be at least 22 miles an hour, to enable the apparatus to work.

In comparing the tractive force of a locomotive engine, as limited by adhesion, with the resistance and gravity of the train which it is to draw, it is obvious that the resistance due to friction and concussion *of the engine itself* is to be left out of account; for that resistance does not constitute a backward pull on the engine, tending to make the driving wheels slip.

It appears, then, that the *available tractive force* of a locomotive engine in ascending a given inclined plane, which must be at least equal to the resistance of the heaviest train that it has to draw, is to be found by subtracting from the adhesion that component of the weight of the engine which acts as a resistance to its ascent; that is to say, the weight of the engine, divided by the number of times that the length of the inclined plane contains the height of the ascent.

The resistance of the load dragged behind the engine, which must not be greater than the adhesion of the engine, is made up of the resistance on a level and of the resistance due to gravity. The resistance due to gravity is found, as in the case of the engine, by dividing the load by the number of times that the length of the inclined plane

contains the height of the ascent. The resistance on a level is made up of three parts, due respectively to friction, to concussion, and to curvature. The resistance due to friction ranges from .0027 to .004 of the load, according to circumstances. The resistance due to concussion at a speed of 12 miles an hour is about one-tenth of the resistance due to friction; and at other speeds it varies as the square of the speed. The resistance due to curvature, on a curve of 1000 feet radius, is about .0033 of the load; and of other radii it varies inversely as the radius.

Besides drawing the train, the locomotive engine has to overcome the resistance of its own wheels and axles, and of its own mechanism. If the mechanical energy thus expended, while the engine travels a given distance, be divided by that distance, there is obtained the additional train-resistance which would be equivalent to the resistance of the engine; and this being added to the resistance of the tender and train, gives the gross resistance of the engine, tender, and train.

The resistance of the engine consists of two parts: the first, being the resistance of the engine as a carriage, is the same with that of a train of the same weight; the second, being the resistance caused by the strain on the mechanism, bears a certain proportion to the whole resistance of the

engine and train, whether arising from friction, concussion, curvature, or gravity; and that proportion appears to be about one-third. Hence, to calculate the gross effort of a locomotive engine, take the sum of the resistances due to friction, concussion, curvature, and gravity for the gross load, and to that sum add one-third.

The energy exerted by the engine per minute, in foot-pounds, is the product of the effort or gross resistance in pounds and speed in feet per minute. To find the mean effective pressure of steam in the cylinders, divide the energy exerted per minute by the volume swept by the pistons per minute; if that volume is expressed in cubic feet, the quotient will be the required pressure in pounds on the square foot, which divided by 1.44 will give pounds on the square inch. The indicated horse-power of the engine is found by dividing the energy exerted in foot-pounds per minute by 33,000.

The following are some examples of the results of such calculations—the line of railway being supposed straight, and the rails and rolling stock in a good condition, so that the resistance due to friction is only .0027 of the load:—

EXAMPLE.	I.	II.	III.
1. Speed in miles an hour.	24	14	12
2. Ascending gradient, . . .	1 in 133.3	1 in 133.3	1 in 80
3. Weight of engine, . . .	20 tons	30 tons	30 tons
4. Weight of tender, . . .	10 "	12 "	15 "
5. Weight of train, . . .	104 "	245 "	2.8 "
6. Effort or gross resistance, .	4502 lbs.	9241 lbs.	13,057 lbs.
7. Circumference of driving wheel, . . .	20 feet	15 feet	14 feet
8. Stroke of pistons (two in number), . . .	2 "	2 "	2 ft. 2 in.
9. Area of each piston, . . .	250 sq. in.	226 sq. in.	253 sq. in.
10. Mean speed of pistons in feet per minute, . . .	422.4	422.4	328.5
11. Volume swept through by pistons in cubic feet per minute, . . .	11753	13259	11558
12. Mean effective pressure in lbs. on the square inch, . . .	563 lbs.	767 lbs.	834 lbs.
13. Indicated horse-power, . .	228	144	118

The pressure of the steam in the boiler exceeds the mean effective pressure in the cylinder in a proportion depending on the extent to which the steam is worked expansively, and various other circumstances. It usually ranges in practice from 100 to 160 lbs. per square inch above the atmospheric pressure. The speed at which the engine runs when exerting a given effort is regulated by the quantity of steam at the required pressure which the boiler is capable of producing; which quantity depends on the quantity of fuel that can be burned in the furnace in a given time, and the efficiency of that fuel in producing steam.

The consumption of fuel by locomotive engines, per indicated horse-power per hour, may be estimated as ranging from 3 to 5 lbs., and the evaporation from 7 to 9 lbs. per pound of fuel. The whole area of heating surface in ordinary engines varies from 800 to 2000 square feet; and the area of heating surface for each pound of fuel burned per hour varies from about half a square foot to $1\frac{1}{2}$ square foot, and is on an average about 1 square foot. The action of the blast-pipe gives to the locomotive engine the power of adapting its consumption of fuel to the work which it has to perform within certain limits. Hence the rapid consumption of fuel by heavy and powerful engines, in ascending steep inclined planes, is to a great extent compensated by the saving which takes place in descending.

Both engines and carriages may be adapted to sharply curved lines of railway by means of the bogie, a truck capable of turning about a pivot into various positions relatively to the carriage or engine which it supports. For the purpose of ascending gradients on which the ordinary adhesion would be insufficient, locomotives have

been introduced in which the engine drives a pair of small horizontal wheels, which grip between them a central rail with a force that can be adjusted so as to prevent slipping.

Locomotive engines for common roads fell for many years into disuse, but have been revived in the traction engine. Various forms of this machine have been invented. The most successful is that patented by Mr. R. W. Thompson, and which, after a series of most crucial experiments, is now coming into general use. It was at first employed on the common roads in India in 1870, and so successful did it prove, that several others were sent out in the following year, and are now in active operation for the conveyance of passengers, mails, and general merchandise. The essential features of Mr. Thompson's engine consist in the use of very broad wheels, which are covered by india-rubber tires $\frac{1}{4}$ inches in thickness. The tires may either be left unprotected, or they may be covered by an outer ring of steel shoes, each about 3 inches wide. These shoes are bent down at each end so as to embrace the tire, and are then formed into an endless chain by means of connecting links, which leave intervals between the shoes of about an inch in width. The india-rubber is not only to some extent flattened upon the ground by the superincumbent weight, so as to give the wheel a large surface of contact, but it also adapts itself to all the inequalities of this surface, filling cavities and giving way to projections in such a manner that the level of the axle is unaffected by either, and that the vehicle passes over the roughest roads with little jolting. The sort of cushion thus constantly presented to the road has been likened to the foot of an elephant or camel; and its general effect is to render the wheel almost prehensile in relation to the surface over which it passes, and thus to give extraordinary facilities for ascending and descending the steepest gradients. The chain of steel shoes is found to interfere but little with these valuable properties; and at the same time to be, under certain conditions, of great use, not only as a protection, but by increasing the firmness of the hold.

LOCRIAN. See **LOKRAN.**

LOCUST is the name of certain insects of the family Acrididæ, which belongs to the order ORTHOPTERA. The name locust is usually limited to any destructive migratory insect of the Acrididæ, which family is distinguished by short stout antennæ, sometimes clubbed at the tip, three-pointed tarsi, and the absence of a projecting ovipositor.

The celebrated locust of the East (*Pachytylus migratorius* or *Lalipoda migratoria*) is about $2\frac{1}{2}$ inches long, of a greenish colour, obscurely spotted, with its elytra pale brown with black markings. It is spread through Western Asia, Northern Africa, and Southern Europe, extending its ravages into Northern Europe, and even occasionally into England; it also extends to China, Japan, and Australia, and all over Africa to Madag. A nearly-allied species, *Pachytylus cinerascens*, is commoner in South-east Europe and the British Isles. The terrible ravages committed by locusts are familiar to all. "We are the army of the Great God," said a locust to Mohammed, in the Arab fable; "we produce ninety-nine eggs; if the hundred were completed we should consume the whole earth and all that is in it." The prophet Joel (chap. ii.) gives an account unparalleled for correctness and sublimity of the appearance and ravages of these terrible insects. Nothing is spared by their voracity. From the egg they devour grass, grain, the leaves of trees, and every green thing with indiscriminate and merciless avidity. They swarm in myriads and obscure the light of the sun in their flight, and when they settle on the ground they seem to cover the face of the earth with a living veil.

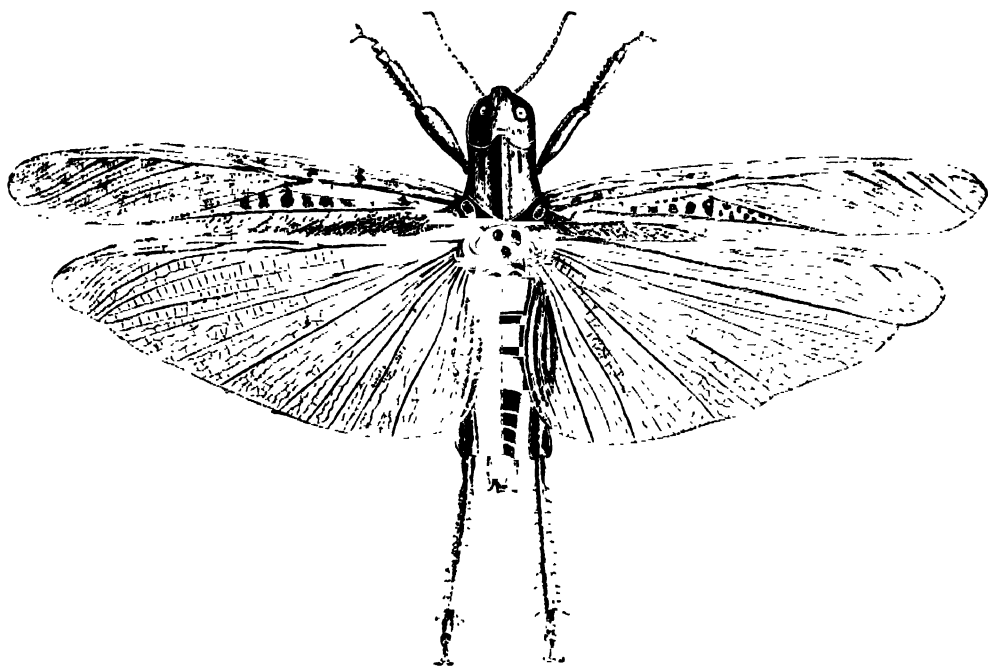
When about to lay her eggs the female locust thrusts her abdomen into the surface of the ground up to her wings, standing on her four front wings, the hind pair

being held up out of the way. A deep hole, slightly curved, is made by means of the ovipositor, and in this the eggs are deposited, numbering on the average thirty-two. Over the eggs the locust exudes a glutinous secretion, which hardens so as to form a long cylindrical cocoon. The adult insects, male and female, are killed off as the summer advances by the failure of food. But the eggs remain in the ground till they are hatched by the warmth of the spring sun, usually early in March. The grubs, which are of a light brown colour, commence their march in search of food as soon as they are hatched, moving straight forward, and devouring everything green that comes in their way. There is no period of inactivity, as with many insects, in their progress from the larval to the mature condition. The grub increases rapidly in size, rudiments of wings appear, and in a short time the perfect-winged locust appears, ready to fly off to "pastures new," and continue

its career of destruction. It is only when the locusts are in the wingless condition that any head can be made against them. Much can be done by collecting and destroying the eggs, but it is certain that these insects can be destroyed most easily and effectually in the stage between the egg and the winged insect. Since the British occupation of Cyprus regular campaigns have been fought against the locusts every year, till in 1881 it was estimated that about 56,000,000,000 had been trapped, while the remnant that had escaped destruction was insignificant.

In Eastern countries locusts are used as food, the wings and legs being pulled off, and the bodies fried in butter or oil; sometimes they are dried, reduced to powder, and used like flour.

Aceridium peregrinum, a larger species than the common migratory locust, extends through Africa and tropical Asia, and is fully as destructive. It is only very rarely



Locust (*Paddytylus migratorius*).

seen in Europe. The closely-allied North American locust (*Aceridium americanum*) is said not to be migratory. The best known locust in the United States is the Rocky Mountain Locust (*Caloptenus spretus*) or "hateful grasshopper," as it is also called. It is a small insect, about the size of some of our common grasshoppers, but has earned notoriety for its powers of destruction.

Locusts have not escaped the common fate of harbouring parasites. Numbers of the eggs are devoured by the larvae of the bee-flies (Bombyliidae). Other parasites, mites, and worms attack the mature insect. In all stages they are preyed upon by predatory insects, insect-eating birds, and mammals.

LOCUST TREE is the *Robinia pseudacacia* of botanists, a North American forest tree. The same name has also been given to the *Ceratonia Siliqua*, or Carob Tree. See CAROB, ROBINIA.

LODES are rock-fissures of considerable longitudinal dimensions, containing minerals in a highly crystalline condition. As a mining term great latitude is allowed to its meaning, and almost any highly-inclined metallifer-

ous deposit, narrow in comparison to its length, might be called a lode.

Lodes occur generally in more or less highly altered rocks; they mostly occupy large fissure veins, extending irregularly often for considerable distances, and penetrating to unknown depths. In any particular district there is generally one main system of parallel lodes, which trends in the same direction as the plication of the strata of that district. Across this principal system there is usually a transverse system, which often differs in the nature of its contents from the preceding, and may be of a later age.

Some lodes are wholly filled with quartz or other earthy mineral, but the lodes most sought after are those containing, in addition, some metalliferous mineral of commercial importance. All the metals in ordinary use occur primarily in lodes. They mostly exist as sulphides, but oxides and other combinations are less common. The sulphates are generally secondary products, formed by the oxidation of the sulphides; from these many of the carbonates are derived by the reaction of carbonated substances.

These metalliferous lodes are for the most part filled

with sparry and stony substances called the *reinstone* or *gangue*, but containing veins and here and there irregular masses or *bunches* and strings of the metallic ores, often of immense size and value, and which it is the principal business of the miner to discover and extract.

Small veins passing off from the ore to the rocks are called *strings*, or, when very small, *threads*. These terms are illustrated by the various dimensions of the vein *abcd* (fig. 1). The miner sometimes arrives at a piece of dead ground devoid of ore, or where the vein breaks up into several branches; when a string of ore extends on either side of a piece of country in the vein, the lode is said to *take a horse*, as at *f'g*.

Veins are often found intersecting one another, a circumstance first pointed out by the geologist Werner. Fig. 2 shows a remarkable example, copied from the Neuhoellmünger-Fladen mine, near Freiberg, in Saxony. Such an intersection is to be rationally explained by supposing that it was accompanied by a slip or fault, which has produced the shifts of position in the older vein. As a further

illustration see the vertical section in fig. 3, from Huel Pever Mine, in Cornwall, where the tin vein, *a*, has been first displaced by the intersection of the copper vein, *b*, accompanied by an upheaval to the south, *S*. Afterwards the displaced vein of tin and the copper vein have both been affected by the fault *c*, which has carried them down-

Fig. 2



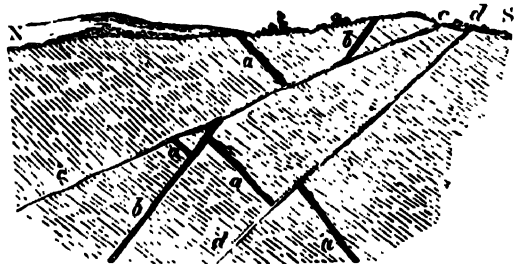
wards to the north, *N*; and lastly, the fault *d* has again placed a portion of *a* upward to the south.

The outcropping portion (*a*, fig. 1) of a metalliferous lode generally consists largely of quartz and hydrated oxide of iron; it is formed by the removal of the soluble salts from the lode by percolating water, and is called the *gossan*.

Lodes vary greatly both in the nature of their contents and in their structure. They appear to be much influ-

enced by the strata through which they pass, a change of rock often effecting a change in the contents of the lode. Contact with igneous rock appears to be favourable for the production of minerals; many of the rich lodes of Cornwall being in the clay slate or *killas* adjoining bosses and protrusions of granite, and passing into that rock in depth;

Fig. 3.



besides this, the *cleans* or igneous dykes of that county in most instances increase the richness of these lodes. The subject is, however, one of extreme complexity, and the knowledge of the formation and of the laws affecting mineral deposits is in a very imperfect condition.

LODGINGS, THE LAW OF. See LANDLORD AND TENANT.

LO' DI, a town of Italy, the capital of a province of the same name, is a well-built episcopal town, on the right bank of the Adda, with 21,000 inhabitants. It has a royal lyceum and a gymnasium, a theological seminary, an orphan asylum, two hospitals, the Barni and Martini palaces, a savings' bank, a public library of 15,000 volumes, and a Monte di-Pietà. There are some manufactures, and a considerable trade, especially in Parmesan cheese. The most interesting structures in Lodi are the Church of L'Incoronata, and the stone bridge over the Adda, famous for the defeat of the Austrians by Bonaparte on the 10th of May, 1796. On that occasion the personal intrepidity and gallantry of Napoleon shone as conspicuously as his skill as a tactician.

LODOI CEA (Sechellarum) is the name of the palm-tree which produces the double cocoa-nut, or *coco de mer*. This tree grows only in the Seychelles Islands, and until these were discovered in 1743 the nuts, which were occasionally found floating about in the Indian Ocean, excited the greatest wonder and even superstition. Rumphius spoke of them as the "mirum miraculum naturæ, quod princeps est omnium marinarum rerum, quæ raræ habentur," but thought that the Chinese set rather too high a value upon their medicinal properties in administering the powdered albumen which lines the nut as an antidote to all poisons. The tree grows to a height of 80 or 90 feet, and is crowned by immense fan-shaped leaves, which are sometimes as much as 20 feet long and 10 broad. The male and female flowers are borne on separate trees, and only appear after the tree has attained the age of thirty years. The tree does not reach its full height till about 100 years old, and the fruit is ten years in fully maturing.

LO'ESS is a fine-grained, calcareous, clayey material, occurring in many districts, and often of considerable depth and extent. It varies greatly in its mode of origin. In the Thames valley, where it occurs, it contains large angular blocks, which suggest the presence of ice during its formation; and beneath it have been found the relics of man associated with those of large Mammalia. Along the Danube and Rhine there is a thick deposit of it rising to a considerable altitude, and considered to be a deposit of glacial mud; along the Mississippi valley there is a somewhat similar deposit, but bearing evidence in some

places of a subaerial origin; while in China there is a very thick deposit of this material, where it has been formed by the accumulation of fine dust carried by the wind.

LOFO'DEN ISLANDS, a group of islands situated opposite the coast of Salten, in Norway, divided from it by an arm of the sea called West Fjorden. They constitute a rocky chain, which near the continent runs nearly due west, but further to the west declines to the south-west. They consist of ten principal islands, surrounded by an archipelago of smaller ones, and are all rocky and mountainous, with bold and much-indented coasts. The rocks are primary. They are separated from each other by narrow straits, through which the sea flows during the tides with a rapidity resembling a torrent. In some parts it forms very deep and extensive eddies, among which the whirlpool called the *Maelstrom*, which is found between the islands of Moskenisøe and Moskøe, has obtained celebrity, as it is dangerous to sailing-ship navigation in stormy weather and during the strength of the tides, and has caused much loss of life. The largest islands are Hindoen, East and West Waagen, Langoen, Andøe, Flagstadøe, Vaerøe, Hvaløen, Hulmen, and Ringhadsøe. The population of the group does not exceed 5000 individuals; but the islands are a great centre for the Norwegian cod and herring fisheries, and during the fishing season they are visited by between 3000 and 1000 boats, manned by from 15,000 to 20,000 men. The annual produce of the fisheries is estimated at about 9000 tons of dried fish, 22,000 barrels of cod-liver oil, and 6000 barrels of roe. The cod fishery terminates in April, and the herring fishery then commences, and continues throughout the summer. Several other kinds of fish are caught, and there are immense quantities of lobsters and oysters. The frequent storms and strong tidal currents render the occupation an exceedingly hazardous one. The fisheries have been carried on since the eleventh century.

LOG and **LOG-LINE**, the apparatus by which the velocity of a ship's motion through the water is measured. The log is a flat piece of wood, loaded with lead at one of its edges to make it float upright; and to this is attached a line about 150 fathoms long, divided into equal lengths by little pieces of knotted twine rove into it. These divisions begin about 20 or 30 yards from the log, where a piece of red rag is usually fastened, in order to show the place readily. From the lee quarter of the vessel the log is thrown into the sea, where it is supposed to remain stationary during the operation, and the line is veered out at least as fast as the ship sails. As soon as the red rag leaves the reel a half-minute glass is turned, and when the sand is all run down the reel is stopped. Then by measuring the quantity of line run out, the distance sailed by the vessel in half a minute is known, and by calculation its rate of going per hour. The usual way of dividing the line is to place the knots at distances of 50 feet from each other. Now, as 120 times half a minute make an hour, and 120 times 50 feet make almost a geographical mile, so many knots will run from the reel in one experiment as the vessel sails miles in the hour; from this comes the expression of a vessel's sailing so many knots (\equiv miles) an hour.

Of late years Massey's patent log has been much used, with great benefit to navigation. It may be allowed to tow astern for hours, and the speed of the ship during the interval is accurately noted on a self-registering dial.

LOGANIA/CEÆ is an order of plants belonging to the series Gentianales of the GAMOPETALÆ. This order is interesting as containing the genus *Strychnos*. *Nux-vomica* seeds, from which strychnia is prepared, grow on *Strychnos Nux-vomica*. The Woorali poison of Guiana owes its deadly nature, according to Schomburgk, to *Strychnos toxifera*. The species are trees, shrubs, or herbs with opposite leaves and stipules, which are sometimes reduced to a transverse line. The calyx is four or

five-cleft. The corolla is regular, hypogynous, the lobes four or five, sometimes numerous; the stamens of the same number attached to the corolla. The ovary is two-celled, superior, with axile placentation; the style is simple with terminal stigma. The fruit is a capsule, drupe, or berry.

LOGARITHMS (Gr. *logos arithmos*, the number of the ratios). If we have a quantity a raised to a certain power (integral or fractional), so that $a^x = m$, then a is called a base, and x is the logarithm of m to the base a ; that is, a logarithm is the power to which the base must be raised in order to equal the number required.

The idea of logarithms originally arose (in the mind of John Napier, of Merchiston, in Scotland) from the desire to make addition and subtraction supply the place of multiplication and division. A table, in which are registered 1, a , a^2 , a^3 , &c., supplies this desideratum to a certain extent; for, since a^x multiplied by a^y gives a^{x+y} , we find the product of the first two by adding their exponents and looking in the table for the $(x+y)$ th power. But every number may be regarded as a power of some root. The number 16 is the square of 4, the fourth power of 2, &c.; and when it is not possible to express a number as an integral power of an integral base, it is always possible to express it either by using a fractional exponent or a fractional base, or both. But taking the easier example first, we can see that for the set 1, 2, 4, 8, 16, &c., a table of logarithms is easily constructed, a specimen of which is as follows:—

Num.	Log.	Num.	Log.	Num.	Log.
1	0	32	5	1024	10
2	1	64	6	2048	11
4	2	128	7	4096	12
8	3	256	8	8192	13
16	4	512	9	16384	14

Thus, to multiply 64 and 128, that is, to find the product of the sixth and seventh powers of 2, we need only take the $(6+7)$ th or 13th power, which, from the table, is 8192.

Such a table would be useless for general purposes, since it omits more numbers than it contains. But if we take a very little greater than unity, the powers will increase but slowly, and every whole number within given limits may be made either a power of a , or very near to a power of a . Suppose, for instance, that we wish for a table of logarithms which shall contain among its numbers either every whole number under 1,000,000, or a fraction within h of every number under 1,000,000. Extract the square root of 1,000,000, the square root of that square root, and so on, until the r th root of 1,000,000 has been extracted, and let this r th root be $1+t$. It is obvious that this extraction may be carried on until t is as small as we please. Consequently $(1+t)^r$ is 1,000,000, and every lower power of $1+t$ is less than 1,000,000, so that (m standing for 1,000,000) no two consecutive powers differ by so much as the difference of m and $m(1+t)$, or by so much as mt . If, then, we proceed with the extraction until mt is less than h , we shall have t of the degree of smallness required; that is, since every whole number less than m lies between two powers of $1+t$, having exponents less than r , *a fortiori* every such whole number must be within h of some power of $1+t$.

This is, in fact, the first view which was taken of the method of constructing tables of logarithms; and it must be remembered that Napier was not in possession of the modern way of expressing the powers of quantities. On the methods of facilitating such enormous computations, and on the details which still remained for the first calculators after they had applied all the analyses which they had, we have not here to speak; but we shall now show how the table may be formed by mere labour, and how the word logarithm arises.

Let us suppose that our system is to be such that, 0 being the logarithm of 1, 100,000 shall be the logarithm of 10. If the hundred-thousandth root of 10 be extracted and called $1+t$, it would be found that 2 is very nearly the 30103rd power of $(1+t)$, that 3 is very nearly the 47712th power of $1+t$, and so on. If, then, beginning with 1, we increase it in the ratio of 1 to $1+t$, giving $1+t$; if we increase this in the ratio of 1 to $1+t$, giving $(1+t)^2$, and so on, it appears that we shall reach 2 (or very near to it, one way or other), when 30103 such ratios have been taken; or, if we pass from 1 to 10 by 100,000 steps, increasing each time in the same ratio, we shall come nearest to 2 in 30103 steps, which is therefore the number of times the increase is made in a certain ratio, or the number of the ratios, the *logon arithmos*, or the logarithm of 2.

In such a table it must of course follow that the logarithm of a product is exactly or very nearly the sum of the logarithms of the factors. Since, for instance, 2 being $(1+t)^{30103}$ and 3 being $(1+t)^{47712}$ very nearly, 6 must be very nearly $(1+t)^{77815}$. Nor is this property altered if we divide or multiply all the logarithms by the same number. If, then, we divide every logarithm by 100,000, the logarithm of 10 becomes 1, that of 2 becomes .30103, and that of 3 becomes .47712, as in the common tables.

It was evident from the first that the connection between a logarithm and its number must be of the following kind: when the logarithm increases in arithmetical progression, the number must increase in geometrical progression; so that, if a and $a+b$ be the logarithms of A and AB , then $a+2b$, $a+3b$, &c., must be the logarithms of AB^2 , AB^3 , &c. Several mathematicians had formed this conception; but the preliminary difficulty which stopped their progress was their being unable to present the series of natural numbers (or fractions of a high degree of nearness to them), in the shape of a geometrical progression. The great merit of Napier is threefold: first, he distinctly saw that all numbers within any given limit may be either terms, or as near as we please to terms, of a geometrical progression; secondly, he had the courage to undertake the enormous labour which was requisite for the purpose; thirdly, he made an anticipation of the differential calculus in developing the primary consequences of the definition.

Napier's method was not exactly that now known by his name. What we call Napierian (or hyperbolic) logarithms are the logarithms upon a base e ; and e represents this formula:—

$$1 + \frac{1}{1} + \frac{1}{1.2} + \frac{1}{1.2.3} + \frac{1}{1.2.3.4} + \&c.;$$

or if it be brought into the decimal expression it is the number 2.718282. This is the formula which was later on adopted as a base by those who preferred not to use the common or decimal logarithms of Briggs; and it is still used invariably in analysis and in mathematical investigations. In ordinary use $\log m$ means the logarithm of m on the base 10, or $\log_{10} m$; but in mathematical words $\log m$ would mean the logarithm of m on the base e , and is sometimes for clearness written $\log_e m$. But the logarithms on the original base of Napier (L) were to those on base e (l) as

$$L = 10^7 \log_e 10^7 = 10^7 l;$$

and the logarithms decrease as the sines increase. The account of his discovery, the most important contribution of England to the exact sciences except Newton's "Principia," was given in Napier's little book published in 1614 at Edinburgh, "*Mirifici Logarithmorum canonis descriptio*," which contained an account of logarithms and a table of the logarithms of natural sines for every minute of the quadrant to seven or eight figures. At this time the

professor of geometry at Gresham College, London, was Henry Briggs, and he was so astonished at the new and powerful weapon of calculation thus put into the hands of mathematicians, that he set out on a visit to Napier in 1615, and repeated his visit before the death of the baron in 1617. Briggs saw clearly that if the base 10 were substituted for the Napierian base great advantages would follow. It will be seen, for instance, in what is said beneath, that either multiplying or dividing by 10 does not alter the fractional part of the logarithm (the *mantissa*) at all, and that the characteristic, or integral part, can be written down by mere inspection. Great convenience of tabulation, of course, results from this, as only variable parts need be tabulated, and much more can be got upon a page, to the greater facilitation of consultation. Briggs' book was published with the warmest commendation, and in fact with the help and valuable improvement, of Napier in 1617, the year of the latter's death. Its title is "*Logarithmorum Chilias Prima*," and it is only a small octavo of sixteen pages, running up from 1 to 1000, and calculated to fourteen places of decimals. This was the first table of common logarithms on the base 10. It is very rare, but there is one copy in the British Museum. In 1624 Briggs, who had been diligently at work on his calculations, published his "*Arithmetica Logarithmica*," extending his first series to 20,000, and adding a new series from 90,000 to 100,000, also to fourteen places of decimals, filling 390 pages.

The great gap Briggs had left was filled by a Dutchman, Adrian Vlacq of Gouda, in 1628. He reduced Briggs' tables to ten places of decimals only, and added in the same scale full tables from 20,000 to 90,000, so that at last all the numbers from 1 to 100,000 were tabulated for logarithms on the base 10. Since this time only Sang (1871), and he but partially, has attacked the stupendous mass of calculation involved in the construction of tables; and though errors are occasionally discovered and corrected, the table of Briggs and Vlacq is substantially that in use to the present time.

The extension of the work in other branches occupied both these unwearied calculators. Gunter, a colleague of Briggs, had published in 1620 a logarithmic table (*canon triangulorum*) for trigonometrical purposes, giving logarithmic sines and tangents on the Briggsian system for every minute of the quadrant, to seven places of decimals. Vlacq's book of 1628 had an appendix giving logarithmic sines, tangents, and secants for every minute up to ten places, in his adopted scale. In 1631 Briggs completed this work for every hundredth of a degree, and Vlacq published Briggs' work at Gouda in 1633 with the title "*Trigonometria Britannica*," the sines running to fourteen places and the tangents to ten places; and in the same year Vlacq published his own "*Trigonometria Artificialis*," giving logarithmic sines and tangents to ten places for every ten seconds of the quadrant, that is, 360 to a degree. It is a great pity that the division of Briggs into the hundredths of a degree was not maintained; but somewhat of this advantage is now gained by the practice of dividing the second into hundredths.

The first table of Napierian logarithms (to the base e) was issued by Speidell in 1619 for sines, tangents, and secants, up to five places of decimals for every minute, and the great strictly Napierian canon of Ursinus, enlarging Napier's own work in his own lines, appeared at Cologne in 1624. It goes to eight places, and has never been rivalled. It is not necessary to continue the history further, as, except Mr. Sang in 1871 (who computed afresh the logarithms for from 100,000 to 200,000), very little actually fresh calculation has been done. It must, however, be noted that although we now explain logarithms as exponents, this is a comparatively modern idea, and was quite unknown to either Napier or Briggs.

The formula for converting logarithms constructed upon any given base, a , to Napierian or natural logarithms is $\frac{1}{\log a}$. This factor $\frac{1}{\log a}$ is called the modulus of the system whose base is a . In Briggs' system the modulus = .4342945 nearly, and the logarithms of this system being called "common logarithms" we have

$$\text{Common log } x = .4342945 \times \text{Nap. log } x;$$

or very close to $\frac{43}{99}$ of the Napierian logarithm. So also, reversing the process, we have

$$\text{Nap. log } x = 2.3025851 \times \text{com. log } x.$$

It must be admitted that Briggs, by his construction of the decimal system, divides with Napier the merit of inventing logarithms considered as an instrument of calculation. In the Napierian system the table must either be carried to an enormous length, or whole numbers only must have logarithms, and every logarithm of a fraction will require two entries of the table and a subtraction. But in Briggs' system the logarithm of every decimal fraction can be found by one entry of the table and one inspection of the fraction.

The peculiarity of this system (the base of which is 10) is as follows:—Every number or fraction is either a power of ten, positive or negative, or lies between two powers of ten. The powers of ten are ranged in the following table:—

$10^{-4} = .0001$	$10^0 = 1$	$10^1 = 10$
$10^{-3} = .001$		$10^2 = 100$
$10^{-2} = .01$		$10^3 = 1000$
$10^{-1} = .1$		$10^4 = 10000$

But the logarithm of 1 being 0 and that of 10 being 1 (upon the Briggsian or common system) the logarithms of 2, 3, 4, 5, &c., must be more than 0 and less than 1—that is, must be some fraction. Calculating what fractional exponent of 10 gives the figure 2 (that is, what is the logarithm of 2) we find

$$\begin{aligned} 2 &= 10^{.30103} \\ \text{and so also } 3 &= 10^{.47712} \\ 4 &= 10^{.60206} \text{ \&c.} \end{aligned}$$

Further, the logarithm of 10 being 1 and that of 100 being 2, the logarithms of 20, 30, 40, &c., must be 1 and some fraction; and on calculating we find

$$\begin{aligned} 20 &= 10^{1.30103} \\ 30 &= 10^{1.47712} \\ 40 &= 10^{1.60206} \text{ \&c.} \end{aligned}$$

And speaking generally, we find that the *characteristic* (the integral part of the exponent or logarithm) is always a figure less by one than the quantity of the digits in the number given. The logarithm of 1052 will be 3 and a fraction, the logarithm of 65,421 will be 4 and a fraction, and so on. But further, the fractional portion of the logarithm, which is called the *mantissa*, does not vary for any number so long as it is either multiplied or divided by 10. The examples of logarithms 2, 3, 4, and of logarithms 20, 30, 40, given above, show this completely. The characteristic varies, the mantissa remains the same. By way of further illustration we may take the number 67,851 and successively divide it by 10, thus:—

67854	has for its logarithm	4.831576
6785.4	"	3.831576
678.54	"	2.831576
67.854	"	1.831576
6.7854	"	0.831576
.67854	"	-.168424
.067854	"	-.931576

The last two have *negative* characteristics, and further divisions by 10 would continue to give such negatives, but the mantissa is always regarded as positive. To distinguish this the negative sign is placed above, not before, the characteristic.

The following are the logarithms from 1 to 100.

No.	Log.	No.	Log.	No.	Log.	No.	Log.	No.	Log.
1	0.000000	21	1.322219	41	1.612784	61	1.785330	81	1.908485
2	0.301030	22	1.342413	42	1.623249	62	1.792892	82	1.913134
3	0.477121	23	1.361728	43	1.633468	63	1.798411	83	1.919078
4	0.602060	24	1.380211	44	1.643453	64	1.803180	84	1.924279
5	0.698970	25	1.397940	45	1.653213	65	1.812913	85	1.929719
6	0.778151	26	1.414973	46	1.662758	66	1.819544	86	1.934498
7	0.845098	27	1.431361	47	1.672098	67	1.826975	87	1.939519
8	0.903090	28	1.447154	48	1.681241	68	1.833509	88	1.944483
9	0.954243	29	1.462398	49	1.690199	69	1.838849	89	1.949390
10	1.000000	30	1.477121	50	1.698970	70	1.845098	90	1.954243
11	1.041393	31	1.491362	51	1.707570	71	1.851258	91	1.959041
12	1.079181	32	1.505150	52	1.716003	72	1.857332	92	1.963788
13	1.113943	33	1.518514	53	1.724276	73	1.863324	93	1.968483
14	1.146128	34	1.531479	54	1.732394	74	1.869232	94	1.973128
15	1.176091	35	1.544068	55	1.740363	75	1.875061	95	1.977724
16	1.204120	36	1.556302	56	1.748188	76	1.880814	96	1.982271
17	1.230449	37	1.568292	57	1.755875	77	1.886491	97	1.986772
18	1.255273	38	1.579984	58	1.763428	78	1.892095	98	1.991226
19	1.278754	39	1.591405	59	1.770852	79	1.897627	99	1.995645
20	1.301030	40	1.602600	60	1.778151	80	1.903090	100	2.000000

But in regular tables the characteristic, here expressed, is omitted; it can be instantly supplied, being 1 for two figures, 2 for three figures, 3 for four figures, &c., as shown above. And many further compressions are made, as in the celebrated tables of Hutton, of which the following is an example.

N. 25500		L. 406		OF NUMBERS.										37	
N	0	1	2	3	4	5	6	7	8	9	D.	Pro.			
2550	4065402	5572	5742	5913	6083	6253	6421	6591	6761	6931	170	1	17		
51	7105	7275	7415	7615	7786	7956	8126	8296	8466	8637		2	34		
52	8807	8977	9147	9317	9487	9658	9828	9998	0168	0338		3	51		
53	4070508	0678	0818	1018	1189	1359	1529	1699	1869	2039		4	68		
54	2209	2379	2549	2719	2889	3059	3229	3399	3569	3739		5	85		
&c.	&c.											6	102		
												7	119		
												8	136		
												9	153		

There are several varieties of arrangement in the published tables, but this will serve to show in a general manner

the way in which all are used. The special modifications fitting each table are of course published with it.

If we want the number of a logarithm it is called an *argument*, and we *enter the table* with such and such an argument. Let us suppose that we want to find the logarithm of 2554. We enter the table with the argument 2554, and we find the logarithm to be 4072209, that is, the mantissa of it. The characteristic we know to be 3 (as the argument has four figures), and the whole logarithm is therefore 3.4072209. It will be observed that the first three figures of the mantissa are only given in the column marked 0, and there only when they change, as from 4060000 to 4070000 in the example given. The columns headed 0, 1, 2, 3, &c., give the logarithms (the last four figures of them) as they vary with the fifth figure of an argument of five figures. Thus the logarithm of

$$\begin{array}{rcl} 25500 & = & 4.4065102 \\ 25501 & & 4.4065572 \\ 25502 & & 4.4065943, \text{ \&c.} \end{array}$$

It will be observed that the change from 406 to 407 occurs in column 8 (line three), so that the logarithm of

$$\begin{array}{rcl} 25527 & = & 4.4069908 \\ 25528 & = & 4.4070168 \end{array}$$

and the exact point of change is very clearly indicated, as in the example.

The column D shows when the difference between successive logarithms alters. In the first lines of the column it is sometimes 171, sometimes 170; but at the fifth line 171 never occurs; after that the differences are 170 and presently 169. Fourteen lines lower down 170 disappears and the differences are 169 and presently 168; and so on.

The column "Pro." is for proportional parts. If we require the logarithm of 25500.6 we find the logarithm of 25500 to be 4.4065402, and the logarithm of .6 to be 102, which we add to the first, and so get

$$\log \text{ of } 25500.6 = 4.4065504.$$

If we want an eighth figure we must divide the proportional part by 10. Thus, if we require the logarithm of 25500.64, and we have that of 25500.6 as above, we find the logarithm of .04 to be 6.8, which we add (counting it as 7 since it exceeds 6.5), and so we get

$$\log \text{ of } 25500.64 = 4.4065511.$$

But if the number be a whole number of seven digits the same calculation applies, the characteristic alone being altered, thus:—

$$\log \text{ of } 2550064 = 6.4065511.$$

The table thus gives us the power of getting logarithms for very high numbers indeed.

Now supposing we have a logarithm given, say 2.4070848, and it is required to find from the table the number of which this is the logarithm. We neglect the characteristic and look for the mantissa. We find it in column 2, therefore the number required is 25532. But since the characteristic is 2, three of these digits are integral, the solution is therefore

$$2.4070848 = \log \text{ of } 25532.$$

But it is not often that the logarithm is exactly to be found in the table. Let it be 2.4070948 that we desire to find the number for. Neglecting the characteristic for the time, as before, we find the nearest *less* logarithm to be 4070848, which is the logarithm of 25532, and we have still 100 over. The nearest logarithm in the column of proportional parts is 102, which is the logarithm of 2; therefore 2 is the sixth figure required, and 4070948 is found to be the logarithm of 255322. Now as the characteristic 2 demands three digits before the decimal point,

$$2.4070948 = \log \text{ of } 255322.$$

Multiplication and Division by Logarithms.—To multiply numbers together we find their logarithms and add them, then we find the number corresponding to the sum

we have obtained, and that is the product. Thus, multiply together 52 by 734, and the product by 6—

$$\begin{array}{rcl} \log \text{ of } 52 & = & 1.716003 \\ & & = 2.865696 \\ & & \quad 6 = 7.78151 \end{array}$$

$$5.359850 = \log \text{ of } 229008.$$

The answer is 229008.

To divide one number by another subtract the logarithm of the second from that of the first, and find the number of which the remainder thus obtained is the logarithm. Thus, divide 116908 by 5314—

$$\begin{array}{rcl} \log \text{ of } 116908 & = & 5.067845 \\ & & \quad 5314 = 3.725422 \end{array}$$

$$1.342423 = \log \text{ of } 22.$$

The answer is 22.

Or instead of subtracting the logarithm of the divisor we may add its arithmetical complement (*i.e.* its difference from 10) and subtract 10 from the characteristic of the sum. Thus, in the example above, we may use this method and obtain the same result.

$$\begin{array}{rcl} \log \text{ of } 116908 & = & 5.067845 \\ \text{Arithmetical complement of log of } 5314 & & 6.271578 \\ \hline & & (adding) \quad 11.342423 \end{array}$$

Deducting 10, we get the result as before.

This method is very useful for continued division. For example, divide 579416 by 4, and the quotient by 23, and the second quotient by 47; or as it is sometimes stated, divide 579416 by 4, 23, and 47.

$$\begin{array}{rcl} \log \text{ of } 579416 & = & 5.762990 \\ \text{Arithmetical complement of log of } 4 & = & 9.397940 \\ & & 23 = 8.638272 \\ & & 47 = 8.327902 \\ \hline & & (adding) \quad 32.127101 \end{array}$$

Whence, deducting 30, as there were three divisors, we get 2.127104 as the logarithm of the final quotient, which we find by the tables to be the logarithm of 134. The answer is therefore 134.

Rule of Three.—Add the logarithms of the two middle terms and subtract the logarithm of the first term. The remainder is the logarithm of the fourth term (the answer).

Involution.—Multiply the logarithm of the number by the exponent of the power. The cube of 67 is obtained thus—

$$3 (\log \text{ of } 67) = 3 (1.826075) = 5.478225 = \log \text{ of } 300763.$$

Evolution.—Divide the logarithm of the number by the exponent of the root. The cube root of 6859 is thus extracted and found to be 19—

$$\frac{1}{3} (\log \text{ of } 6859) = \frac{1}{3} (3.836261) = 1.278754 = \log \text{ of } 19.$$

The immense facilities given by logarithms for calculation are amply apparent from the few examples above given of some of the ordinary rules.

LOG-BOARD and LOG-BOOK. The former is either a large piece of plank, blackened, ruled, and prepared for writing on with chalk; or else a slate with divisions scratched upon its surface; and the latter is the blank book, in which are inserted daily the contents of the board: these are, the course of the vessel, the direction of the wind, and the distance run, as given by the log; in the book is also inserted a record of the different events which occur during the voyage.

The place of the slip thus obtained by the log and compass, is technically termed Dead Reckoning; and this is used until an opportunity is afforded of taking observa-

tions for latitude and longitude, or until some place whose position is known comes in sight; the true place of the ship is then substituted in the log-book for that obtained by dead reckoning, and from that place subsequent reckonings are made until another observation is obtained.

By the 17 & 18 Vict. c. 104, the Board of Trade sanctions certain forms of log-books (called *official logs*), as adapted to particular voyages, and it is rendered imperative on every commander to see that all the entries be made as soon as possible after the occurrences happen which are obliged to be noted. It is also compulsory upon every master of a vessel to produce the log-book for the inspection of any ship of war of his own nation whose captain may require its production.

LOG'GIA (pronounced *Log'ia*), a very beautiful feature in Italian architecture, roughly describable as an upper storey of a house thrown open in the form of an arcade with a gallery behind. The loggie at the Vatican are decorated by Raffaele, and are in consequence so precious that their arcades have been filled in with glass to preserve the masterpieces of the great artist. The architectural charm of the loggie has thus been necessarily sacrificed.

LOGI, one of the great giants of the Norse mythology (not to be confused with the god **LOKI**), was the god of flame, and was to be seen with his family in every great conflagration, their heads crowned with waving chaplets of fire. They were the enemies of man, striving to hinder his work and destroy all he had made. Kari (storm), Hler or Ogir (sea), and Logi (fire), were all descended from the first giant, Ymir (seething clay), a monster who arose under the breeding influence of the sun's rays on the chaotic abyss of Ginnunga Gap. The element of fire, regarded from its beneficent side, and later from its tricky side also, was embodied in the god Loki, manifestly another form of the same word as the name of the violent raging flame-giant Logi. Loki represents fire subdued to will, whether good or bad; Logi, the blind natural devastating force.

Logic is conversant about
Syllogism, or reasoning ex-
pressed unelliptically. Ac-
cordingly, the Organon
explains

1. The parts of a
Syllogism.

2. The Syllogism
itself.

LOGIC, in the extensive signification of the term, offers universal criteria of truth, the study of which affords a systematic discipline to the higher intellectual faculties. Logic and mathematics are the two most ancient sciences and instruments of liberal culture. Under the various names, or in the various departments of dialectic, analytic, organical or instrumental philosophy, the method of science, &c., the intellectual aspiration which produces logic tends towards a practical *science of science*—i.e. a science which should legislate for all the other sciences, providing reasoned methods of pure thought, and methods of applying thought to real existence. In the dialectic of Plato we are raised above the details of the subordinate sciences to the conception of science as an organic whole, and intellectual culture for its own sake. The mutual relations and the methods of the different parts of knowledge, with their respective offices in education, are contemplated; and the comprehensive doctrine thus suggested has, in its fragments if not in its organic unity, maintained a central place in the liberal education of the world. Logicians, in the more strict conception of logic, are those who analyze science *as reasoned*, for the sake of speculative insight and pleasure, and for the practical direction of human understanding; as distinguished from metaphysicians, who, for similar ends, contemplate science *in its first principles*.

The materials for a logical system were first reduced to comparative order by Aristotle, in the six treatises since collected under the name of the *Organon*. But the name *logic* is of later date than Aristotle, and there is no definition of the contents of his *Organon* in his extant works. If we draw from the *Organon*, as we now have it, our conception of the nature of logic, we shall include in it a great deal that, according to one school of logicians, is foreign to the science, while we shall exclude not a little that is essential to it, according to another. The following synopsis of the contents of the *Organon* exhibits its relation to reasoning or syllogism, that is, to truth or science regarded as reasoned:—

(a) With reference to Primary Notions, in the book of the *Categorics*.
(b) With reference to Secondary Notions, in the book of *Enunciation or Proposition*.

(a) Generally, in the *Prior Analytics*.
 Demonstrative Syllogism, in the
 Posterior *Analytics*.
(b) Specially. { Dialectical Syllogism, in the
 Topics.
 Sophistical Syllogism, in the
 Sophistic *Elenchi*.

One part of what is now included in logic, i.e. the doctrine of proposition and syllogism, given in the book of *Enunciations* and in the *Prior Analytics*, has maintained to the present day the form it received from Aristotle. "That logic" (i.e. formal or syllogistic logic), says Kant, "has proceeded in a sure course from the earliest times is manifest from this, that since Aristotle it has not needed to retrace a step, unless in the way of clearing off useless subtleties, or developing with more precision what had been previously suggested."

But knowledge or science may be viewed in two aspects—the formal and the material; and the produce of our thoughts may be *formally perfect* without being *actually true*. Precision, conclusiveness, consistency in the use of terms, and method, are some of the characteristics of *formal* (or in the narrower sense *logical*) truth; harmony between our precise, conclusive, consistent, and methodical thoughts, and the actual order of external nature—between our concepts and the divine ideas expressed in the phenomena of the universe—constitute *material truth*.

Logic, in different hands, has accordingly assumed different types. Two, broadly distinct, are apparent in its history. Of these the one is properly metaphysical or ontological; the other alone is properly logical.

When the two aspects of science—the abstract or formal, and the concrete or material—are merged in one, we have systems of the first type, in which logic proper is merged in metaphysics or ontology. Of these the dialectic of Plato is one specimen, and the so-called logic of Hegel is another. The logic of Hegel is, in its conception, philosophy proper in its widest range. It is the professed science of that which in one aspect is thought and in another existence. The Hegelian logic is accordingly divided into the logic of thought *as existence*, and of thought *as such*—into objective and subjective logic. In this system the subjective logic, which treats of thought in notion, judgment, and reasoning or syllogism, is unfolded in intimate connection with ontology, metaphysics, and cosmology—in a word, with the absolute science which is comprehended in Hegel's objective logic. This so-called logic

of Hegel, like the dialectic of Plato, it is much better to relegate to metaphysics or ontology.

In a stricter sense we may define logic as the science of the laws of reasoned thought as such; its office is to describe the conditions and rules to which reasoned thought should conform when it is engaged in the interpretation of nature—in short, it provides for consistency in the use of words, and exhibits the nature and methods of inductive or experimental proof. This formal and material logical system commences with Aristotle. It has assumed one or other of two phases, as the *formal* or the *material* truth and perfection of finite science has received the front place in its development. In the first case we descend from Aristotle with but little change through the schools of the middle ages into modern philosophy, to Kant and Hamilton; in the second case (the aim after material truth) logic becomes the theory and art of scientific induction, and Bacon, Locke, Bentham, Comte, and Mill appear among its chief names, Aristotle still being the *fons et origo*.

A complete system of logic, accordingly, comprehends both these apparently conflicting, yet really harmonious parts—the formal and the material or physical. It is the science of the laws of thought as such, and of the application of thought to nature in accordance with the principles of evidence; and as well as the science, the term logic covers also the corresponding *art* or active outcome of the logical science, namely, the body of rules which has grown up to guide the student in exact reasoning or investigation.

Pure or Formal Logic.—Coleridge speaks of his inability to conceive how any one can, by any spinning, make out more than ten or a dozen pages about syllogistic logic. Nevertheless, an elaborate science, with its axioms and postulates, was constructed by Aristotle, which, since the conception of the science was purified by Kant, has been renovated and extended by Hamilton. It now constitutes a beautifully developed framework, on which judgments and reasonings may be unfolded, and by which the consistency of our thoughts with one another may be tested.

The elementary doctrine of formal logic consists, accordingly, of an exposition of certain quantitative relations of terms to one another in proposition and syllogism, evolved by means of the axioms of non-contradiction, identity, and excluded middle, from the very nature of concepts as such. The framework of this part of logic consists of *forms* for the proposition and logical expression of concrete propositions, and *forms* for the reception and logical expression of concrete reasonings. Its problem is to find the various forms into one or other of which all possible propositions and inferences may be analyzed. The purely scientific pages of a book of pure logic, even on a cursory glance, can hardly resemble the pages of a book in algebra. Symbols and symbolic notation take the place of common words and concrete examples. These symbols and formulas constitute the logical framework for the exposition and exposure of fallacies, and for testing the formal truth of valid reasonings. Thus, at least, is their practical function, and they imply a system of practical rules. Propositional and syllogistic rules compel us to complete and fully state regardless of tautology, in the expansion of our judgments and reasonings, what ordinary language elides; and in this view syllogism is valuable as an instrument which forces us to recognize fully the logical extent and relations of dogmatically assumed premises, but too often unproved or even incorrectly conceived. Syllogistic forms are practically interesting and available as the scientific apparatus for diagnosing into light specimens of verbal ambiguity, argumentative in-elevancy, and false assumption. Therefore, formal logic may be described as a system of rules which afford a universal *formal* criterion of truth.

Accordingly, in the briefest way, we proceed to indicate the main divisions of formal logic; but in this work little more can be done with so large a subject than to state, as

it were, the headings of the chapters. The student desiring more ample information must refer to the noble "Logic" of Mill, or the excellent work of Jevons, or if he desire a short and accurate résumé only, to the "Elementary Lessons in Logic" of the latter (London, 1884).

At the outset the student discovers that logic tells him nothing new, though truly by its help he may discover new things. It aims not at inventing excellent modes of thought, but at discovering the laws of thought which exist, and must exist of necessity, and which we follow whenever we think exactly. Thus we may meet most accurate reasoners who never read a page of logic, as we may meet composers of music who cannot write a note, or poets who never heard of the rules of the sonnet or the hexameter. Yet they unconsciously follow the rules for all that, their sense of beauty and fitness serving to save them from error. Less gifted mortals cannot trust to their unaided sense, and demand rules for their assistance.

Examining any *Proposition* or statement of a fact, we find that one thing is predicated of another thing; as, for instance, "John is good." Here goodness is predicated of John, and John and goodness are called *Terms*. If three propositions are so connected that the third is seen to be necessitated by the first and second together, then the chain of argument is called a *Syllogism*; as thus—

1. We love whatever pleases us.
2. Delicate flattery pleases us.
3. We love delicate flattery.

Each of these three parts of logic has its appropriate kind of mental operation; thus terms demand the exercise of simple apprehension, propositions demand that of the judgment, and the complete syllogism necessitates a judgment of judgments, an act of reasoning *Ratiocination*. The latter is otherwise expressed by saying that we reason from *premises* to a *conclusion*. The first two propositions of the syllogism are the premises; the third, which (if the reasoning is accurate) follows from them, is the conclusion. These various parts demand separate attention.

First, of *Terms*. They are singular, applying to one object only (as all proper names, for instance), or general; they are collective (as a regiment) or distributive (as a soldier); and here it may be remarked that the same term may be both, if used in different senses, as "the 54th Regiment" (distributive), "the bravest regiment of them all" (collective); they are concrete or abstract; positive or negative; relative (as father, for that implies a child) or absolute (as granite, which does not imply any other form of matter). Though absolutes do, in a certain sense, imply a number of attributes, and even of other things than themselves, yet they do not imply *Correlatives* to themselves.

Already we have seen how ambiguous terms may be, and it has been necessary to pause over distributive and absolute. We might have paused over every one, for language is so imperfect an instrument that Talleyrand's jest, "It was given us to conceal our thoughts," sometimes seems lamentably true. The logician, therefore, must always be on the watch over his terms to be sure he has their right meaning. Few, if any, are absolutely *univocal* (of one simple meaning); nearly all are, or may, in certain senses, be *equivocal* or ambiguous. The nearest approach to univocal terms are those of science, which sometimes attain a high degree of precision, and those of individual persons and things (singular terms), as "The Inventions Exhibition of 1885," "John Stuart Mill," &c. Of equivocal words we may take all those which give rise to puns and wordplays, those with added meanings (as foot of a man, of an animal, a table, a mountain, a foot-rule, a body of soldiers not cavalry), as well as those confused by their sound (as air, heir, Ayr, ere) or by their spelling (as the air we breathe, the air we sing, and the air with which we carry ourselves), or in other ways.

Again, all (except singular) terms may be used to "denote" and to "connote." Take the word *metal*, it *denotes* what is said to be the *extension* of the term; that is, to explain it we enumerate all the various *individuals*, gold, silver, &c., to which it *applies*; it *connotes*, on the other hand, what is said to be the *intension* of the term, and to explain it we must enumerate all the *qualities* common to the objects called metals, such as brilliancy, conductivity, readiness to combine in certain defined manners, &c., which it *implies*. The expressions are seen to pair off very exactly; and it is at once observed that as the connotation of a term increases its denotation decreases. For example, if we use the term *iron* instead of *metal* we increase its connotation, for all kinds of iron are alike in numerous characteristics, but we limit its denotation to a few varieties of one only out of the numerous metallic elements.

Turning next to *Propositions*, we find that the logician limits himself to sentences indicative, either affirmative or negative, categorical or conditional; and that imperatives, exclamations, &c., have to be reduced to the form of simple statements before they can be tested. Taking the proposition "*Iron is a metal*," the first term, *iron*, is said to be the *subject* of it, and the second term is the *predicate* stated of that subject. The predicate is seen to be connected with the subject by the *copula* "*is*." Neither subject nor predicate need be limited to one word, as in the following proposition—" [*To grow ever more and more virtuous*] is [*the true reward of virtue*]," where each term contains many words.

The propositions dealt with in logic are *categorical* (which are divided into affirmative and negative) or *conditional* (which are divided into hypothetical and disjunctive). These may be exemplified thus—

Virtue is its own reward (Aff.)
Virtue is not self-seeking (Neg.)
If virtue is its own reward it is well rewarded (Hypoth.)
Either virtue is self-seeking or disinterested (Disjunct.)

Categorical propositions (both affirmative and negative) are further divided into *universal* and *particular*, of which the first affirms the predicate to belong to the whole of the subject, and the second only to a part thereof; as

Universal:

Virtuous men (*i.e.* all of them) have their reward (A).
No virtuous men are self-seeking (E).

Particular:

Some men are self-seeking (I).
Some men are not virtuous (O).

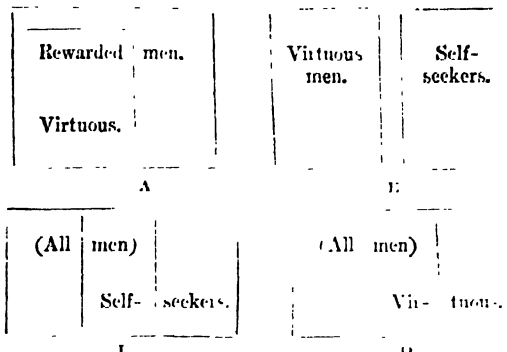
But it is observable that, while the particular proposition is limited (as here, to some men), it does not deny the attribute to the rest of the subject (for perhaps *all* men are virtuous, though only some men are here affirmed to be so).

These four varieties of propositions are, for convenience, designated by letters thus—

Categorical Propositions, $\begin{cases} A \text{ Universal affirmative.} \\ E \text{ Universal negative.} \\ I \text{ Particular affirmative.} \\ O \text{ Particular negative.} \end{cases}$

The vowels may be remembered by *A*ffirmo, *I* affirm, and *n*EGo, *I* deny. Propositions, if not expressly limited, are taken as universal. Thus "*Metals are solids*" would be read as *A*; if meant, as it should be, for *I*, it should run, "*Some metals are solids*," or "*Metals are often solids*," &c. The opposition of propositions may be very well

shown diagrammatically. The four examples given above would appear thus:—



The larger class of rewarded men includes *all* the virtuous (A); the two classes of virtuous men and self-seekers are mutually exclusive (E); some men as a class partly coincide with the class of self-seekers (I); and the class is partly, and only partly, covered by the class of the virtuous men: some men are therefore not virtuous (O). It is evident from the above method, due to the philosopher Euler, that *I* and *O* are forms of proposition which give us information of the whole of their predicate. We are clear that all self-seekers and some men are respectively clearly outside the class of virtuous men, while *A* and *E* a large part of the rewarded men and the self-seekers is not accounted for. This difference is stated in logical language thus—*I* and *O* *distribute* their predicate (*i.e.* refer to all parts of it); *A* and *E* *do not distribute* their predicate; *I* distributes neither subject nor predicate; *E* distributes both; *A* distributes subject only, and *O* predicate only. We now see that *A* is inconsistent with *E* and *O*, but not with *I*, for any proposition, as thus:—

Virtue is its own reward (A).
Virtue is not its own reward (E).
Virtue is sometimes its own reward (I).
Virtue is sometimes not its own reward (O).

But we distinguish *I*, the *contrary* of *A*, from *O*, the *contradictory* of *A*; and we call *I* and *O* *subalterns*. Any proposition in the form *A* or *E* is sufficient to uphold *I*, since the weaker forms *O* and *I* respectively suffice to overthrow them ("*All Cretans are liars*" is disproved by a single Cretan who is not such); but to disprove the weak statements, *O* or *E*, the full battery of *A* or *I* must be displayed. It is found, then, that universal statements are far less easy of defence, and more cumbersome for attack than particular. Of course *A* includes *I*, and *E* includes *O*; *I* and *O* are therefore called *subalterns* of *A* and *E* respectively. In general these rules are found to hold:—

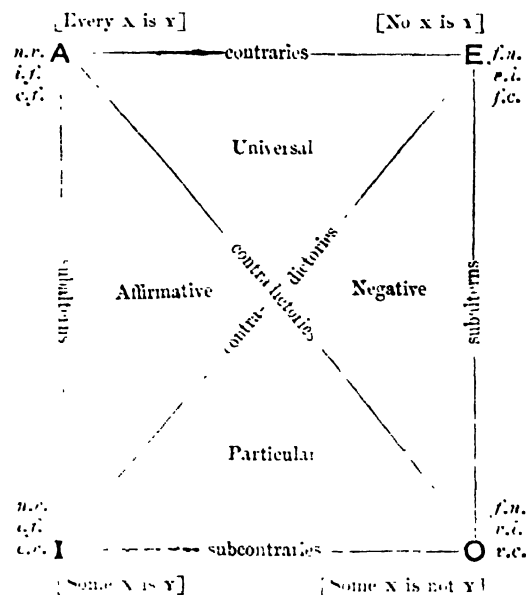
1. Contraries.—Both may be true, both may be false.
2. Subcontraries.—Both may be true, one and one only may be false.
3. Contradictories.—One must be true, one must be false.
4. Subalterns.—Universal true, particular always true; particular true, universal sometimes true sometimes false.

As the truth or falsity of a proposition, supposing the quantity and quality to be known, depends on the *matter*, the following rules may be observed on this subject:—

1. In *necessary* matter, all affirmatives are true and negatives false; as, "*All (or some) heavy bodies gravitate towards the earth*." Here the corresponding negatives, either universal or particular, would be false.
2. In *impossible* matter, all negatives are true and all affirmatives false; as, "*Peninsulas are not surrounded by water*" (meaning either *all* or *some* peninsulas). Here the corresponding affirmatives, both universal and particular, would be false.

3. In *contingent* matter, all universals are false and all particulars true. "Some men are poets," and "Some men are not poets," are both true; but the corresponding universals, "All men are poets," or "No men are poets," are both false.

The following scheme of these relations is from the work of Archbishop Whately; the letters *x* and *y* stand for any subject and predicate; the initials *n.*, *i.*, *e.*, for *necessary*, *impossible*, and *contingent*; *v.* for *verum* (true), and *f.* for *falsum* (false):—



Any significant terms, as *man* and *mortal*, *star* and *inhabited tree*, and *fruit-bearing*, may be substituted for the symbols *x* and *y* in the above scheme; and on the meaning or relation of these terms, *i. e.* their agreement or disagreement, wholly or in part, the truth or falsity of each proposition will depend.

The *conversion of propositions* is an important matter. We convert a proposition when we put predicate for subject, and *vice versa*. Now it is evident that we may not change affirmative into negative, nor may we distribute in the converted proposition any term which was not distributed in the original. Thus, "John" not being distributed (*i. e.* not referring to all my brothers) I cannot turn "John is my brother" into "My brother is John;" but if I distribute "John" by adding "alone" or "only," I can convert "John is my only brother" into "My only brother is John." This is *simple conversion*, and except in this one rare case of the identity of subject and predicate is never applicable to *A*; also it is not applicable to *O*. It is, however, applicable to *E*, which distributes both subject and predicate, and to *I*, which distributes neither. Example, we cannot say "Some poets are not men," because we can say "Some men are not poets" (*e*); but we can rightly say "No slaves are Englishmen" if we know that "No Englishmen are slaves" (*e*).

Conversion per accidens, and contraposition.—Propositions in *A* that cannot be simply converted, may be converted by *limitation*, or, as logicians express it, *per accidens*. Thus, although the proposition, "All quadrupeds are animals," when converted produces the absurdity, "All animals are quadrupeds," yet the conversion may be rendered possible by limiting the term animals, so as to express in the converse exactly what it means in the

exposita. "All quadrupeds are animals," means, when fully developed, "(All) quadrupeds are (some) animals;" and this admits of conversion to "Some animals are quadrupeds." Propositions of the class *A* (excluding the exceptional cases) can therefore be converted only by changing the *quantity*.

But this rule does not apply for the conversion of propositions in *O*. For example, "Some men are not poets," is a particular negative, in which the predicate poets is distributed. Let us, then, transpose the terms, while simply changing the quantity, and this will give, "No poet is a man," which is not an equivalent proposition, but a positive untruth. Conversion is effected in such cases by what is called *contraposition*, that is, by making the negative a part of the predicate, and thereby changing the *quality* of the proposition. Thus, "Some men are not poets" may be considered a particular affirmative (*i*), or may be regarded as another way of saying, "Some men are destitute of poetical-genius;" and, as neither of the terms is now distributed, this may at once be simply converted into "Some who-are-not-poets are men."

In conversion of *A* by contraposition, which is as effective as the similar conversion of *O*, care must be taken, for it is frequently assumed that because "All *X* is *Y*," therefore "All not-*X* is not-*Y*," which does not follow. For, referring to the diagram *A*, we see that though "All virtuous men are truly rewarded men," it is in the highest degree absurd to say that therefore "All not-virtuous men are not-truly-rewarded," for we know the limits neither of the one class nor of the other. The true contraposition of "All *X* is *Y*" is "All not-*Y* is not-*X*," where the *negative of the predicate* is affirmed of the *negative of the subject*. Indeed in our illustrations by the diagram we see that "All not-rewarded men are not-virtuous," for all such men lie outside the larger figure, and therefore, *a fortiori*, outside the smaller one.

The *predicables* or categories are the list of terms or attributes predicable of a subject. Aristotle's famous list was as follows, in Greek, Latin, and English:—

<i>Οὐσία</i> . . .	Substantia, . . .	Substance.
<i>Ποσὺς</i> . . .	Quantitas, . . .	Quantity.
<i>Ποιὸς</i> . . .	Qualitas, . . .	Quality.
<i>Ποσὺς τε</i> . . .	Relatio, . . .	Relation.
<i>Ποιὸν</i> . . .	Actio, . . .	Action.
<i>Παθὼν</i> . . .	Passio, . . .	Passion.
<i>Ποῦ</i> . . .	Ubi, . . .	Place.
<i>Πότε</i> . . .	Quando, . . .	Time.
<i>Κιῶν</i> . . .	Situs, . . .	Situation.
<i>Ἔχειν</i> . . .	Habitus, . . .	Possession.

This enumeration of the categories, under which all our ideas, or rather the objects of all our ideas, may be ranked, is now universally acknowledged to be very imperfect—to be both redundant and defective. It has been, not unjustly, compared to a division of animals into men, quadrupeds, horses, asses, and ponies. Relation, for instance, includes action and passion; place and situation are nearly synonymous terms; while mental states or sensations, as hope, fear, taste, pleasure, &c., appear to be properly included in none of the categories mentioned.

The division at present agreed upon is as follows:—Genus, species, difference, property, accident. Any considerable body of things—as cats, for instance—may be grouped in a *genus*; but as certain groups of this genus show a well-marked *difference* from certain other groups—as tigers from lions, for instance—these are separated into *species*. The species, therefore, is the genus with the difference—a difference not required to mark out a genus or a species, but possessed by them all, a *property*, as, say, the possession of claws with the cat genus. Finally, an *accident* is some peculiarity of an individual, as say the gray-

ness of the fur of a gray cat, &c. The proper division of things into categories is called *logical division*, and bears certain well-marked rules—

- a. The species must exclude each other.
- b. All the species added together must be equal to the genus.
- c. The division must follow one method throughout; and in naming and describing species care must be taken to follow the rules of *logical definition*, which are—
 1. The essential attributes must be stated.
 2. The definition must not contain the name defined or its synonym.
 3. It must cover the whole species, and be limited to it.
 4. It must be intelligible, clear, and precise.
 5. It must not be negative, if possible.

An excellent example of the breach of No. 2 is the well-known definition of an archdeacon as a "person exercising archidiaconal functions;" and of No. 4, Dr. Johnson's too famous definition of a net.

The Syllogism.—All arguments may be reduced to formal statements, and nearly all take the form of a syllogism. The foundations of reasoned thought rest on three truths—

- I. Whatever is, is (identity).
- II. Nothing can at once be and not be (contradiction).
- III. Everything must either be or not be (excluded middle).

Of these the third alone demands a word of explanation. It may be said that it is defeated by a thing being neither hard nor soft, but midway between the two, or by twilight, which is neither day nor night. But the exceptions do not hold, for twilight is either day or not-day, a stone is either hard or not-hard, not-hard including both soft and a medium state.

Further, we need four self-evident propositions, namely—

- a. Two terms, both of which agree with a third term, agree with each other.
- b. Two terms, only one of which agrees with a third term, do not agree with each other.
- c. Two terms, neither of which agrees with a third term, may or may not agree with each other. (From which three axioms it follows that what may be said or denied of a whole class may be said or denied of all its individuals.)
- d. Nothing happens without a *sufficient reason* why it should be so rather than otherwise (the great axiom of Leibnitz).

Now, the syllogism, which is the joining together and comparing of two propositions in thought, rests upon these laws and axioms; and its function is to derive from two propositions a third whose truth is manifest from the truth of the other two. The conditions under which a third proposition fairly arises from two others are the rules of the syllogism, and are eight in number—

1. Every syllogism has three terms and no more, and these terms are called the *major*, *minor*, and *middle* term respectively.
2. The middle term must be distributed once at least (and must not be ambiguous).
3. Every syllogism has three propositions and no more, the *major premise*, containing the major term; the *minor* premise, containing the minor term; and the *conclusion*.
4. No term must be distributed in the conclusion which was not distributed in one of the premises.
5. From two negative premises no conclusion can be drawn.
6. When one premise is negative the conclusion is negative, and *vice versa*.
7. From two particular premises a particular conclusion only can be drawn.
8. When one premise is particular the conclusion is particular, and *vice versa*.

The function of the major premise is to compare the major term with the middle term, that of the minor is to

compare the minor term with the middle term, and that of the conclusion is to draw therefrom the relation of the minor and major terms. Thus, let X, Y, Z be three terms—major, middle, and minor—then we can say—

All Y is X (major premise),
Some Z is Y (minor premise),

whence, by our first axiom and the eighth rule of the syllogism, it follows

Some Z is X (conclusion).

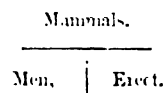
Putting this into ordinary language it might run—

All men walk erect.
Some mammals are men.
Some mammals walk erect.

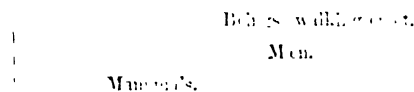
The middle term is known by never occurring in the conclusion, and of the others the major term is always the predicate of the minor term in the conclusion. The second is the most important rule of the syllogism, and half the irregular arguments one meets with sin by "undistributed middles" or by ambiguous middles. Thus, from

All men are mammals,
Some mammals walk erect,

nothing can be inferred, for nowhere is the middle term, "mammals," distributed, that is wholly accounted for. This is self-evident, if we show it diagrammatically.



Men are seen to have no necessary relationship to those mammals who walk erect. But our previous syllogism was valid, since it distributed the middle term, which was "men" in that instance. It may be drawn thus—



Moods and Figures.—As all propositions are either of the form A, E, I, or O, it is manifest that syllogisms must be compounded of these. Such compounds are *moods*. The example just figured was in the mood AII for instance. Now, many of these moods are invalid, because they break the rules of the syllogism. AII breaks rule 6, by giving an affirmative conclusion, although the minor premise is negative; IIA breaks rule 8, by giving a universal conclusion from particular premises; and so on. In fact, only eleven moods are valid, which are—AAA, AAI, AIE, AEO, AII, AOO, IAI, IAO, FIO, IAO, OAO.

Now, although in the conclusion the major term is always the predicate and the minor term is the subject, there is no restriction of this sort in the premises. Thus, taking X, Y, Z as the three terms, as before, the major term may be (if of the form I)

Some X is Y or Some Y is X,

and the minor term (if of the form E)

No Y is Z or No Z is Y.

Therefore, since the conclusion is always of the figure ZX, when X is predicated of Z, we get four figures in all, namely—

	I.	II.	III.	IV.
Major Premise, . . .	YX	XY	YX	XY
Minor Premise, . . .	ZY	ZY	YZ	YZ
Conclusion,	ZX	ZX	ZX	ZX

But, all the eleven possible moods are not valid in each of the four figures. Thus it is found that the mood *A E E* will not serve in the first figure, for if we say "All Y is X, no Z is Y, therefore no Z is X," we have distributed X in the conclusion, which was not distributed in the premises. If, however, we take the same mood in the second figure, we distribute X, and the argument is valid; thus, "All X is Y, no Z is Y, therefore no Z is X." Put into ordinary language we might say, "All good women love their children, A, B, and C do not love their children, therefore A, B, and C are not good women." We find, in fact, that so many of the eleven moods are useless in one figure or another, while they seem well elsewhere, that in all we can only muster nineteen. These nineteen are distributed through the four figures as follows, the jargon, in the form of hexameters, being easily remembered, and being at least six centuries old:—

Barbara | Cela- | rent Dari- | i Feri- | que pri- | oris ;
Cesare | Cames- | tres Fes- | tim Ba- | toko se- | cundur ;
Tertia | Darap- | ti Disa- | mis Da- | tisi Fe- | lapton,
Bokar- | do Fe- | rison ha- | bet ; Quar- | ti insuper | alit
Biaman- | tip Cames- | nes Dima- | tis Fe- | sapo Fres- | ison.

The words in italics indicate the divisions of the moods among the four figures; the vowels of the jargon-words indicate the moods themselves. Thus, *Barbara* is the mood *A A A* in the first figure, &c. Further, all the moods beginning with the same letter may be reduced into the mood of that letter in the first figure, by far the most secure and perfect; thus, all the B's (*Baroko*, *Bokardo*) come to *Barbara*, all the C's (*Cesare*, *Camestres*) to *Celarent*, &c. The manner of this reduction is indicated by consonants following the vowels in the words themselves; *s* demands simple conversion, *p* conversion *per accidens* or by limitation, *m* demands mutation, i.e. the transposition of premises. To take an example, reduce *Camenes* to *Celarent*. *Camenes* is represented by the following:—"All X is Y, no Y is Z, therefore no Z is X." The *m* enjoins that the order of the premises should be changed, major becoming minor, and *vis versa*, and the *s* requires the conclusion to be simply converted. The new syllogism is therefore "No Y is Z, all X is Y, therefore no X is Z," where Z has become the major term and X the minor. The reader may easily put this formula into an ordinary argument by following the examples already given, and may reduce other moods into the first figure. Two only will "give us pause;" these are *Baroko* and *Bokardo*, the *k* in which indicates "indirect reduction," or *reductio ad absurdum*. Thus, for *Baroko* (which, of course, reduces to *Barbara*) "All X is Y, some Z is not Y, therefore some Z is not X." This we are directed by the *k* to regard, temporarily, as a false conclusion, and therefore its contradictory as a true one—namely, "All Z is X." This last we are to use as a tentative minor premise, and thus we get a syllogism in *Barbara*, "All X is Y, all Z is X, whence it follows all Z is Y." But our original minor premise said that "Some Z was not Y;" therefore it is evident our *Barbara* cannot stand, and the original conclusion must be held as true.

A *sorites* is a chain of syllogisms. Thus, "All A is B, all B is C, all C is D, all D is E, therefore all A is E." To check it, it must be reduced to syllogisms, each conclusion becoming a premise to the next syllogism. The above sorites reduces to three syllogisms. A *sorites* can only contain one negative premise (the last) and only one particular premise (the first); all the rest must be universal and affirmative (or *A*) propositions.

Hypothetical Syllogisms.—In these the major premise is hypothetical instead of categorical, as in the form, "If A is B, C is D; but A is B, therefore C is D." Here we affirm the antecedent (A is B), and the syllogism is *constructive*. A *destructive* hypothetical syllogism is that in which the minor premise denies the consequent of the major; thus, "If A is B, C is D; but C is not D, there-

fore A is not B." If we either affirm the consequent, or deny the antecedent, no valid conclusion follows; thus, "If A is B, C is D; but C is D does not prove that A is B," because many other reasons might be required to predicate B of A; similarly, "If A is B, C is D; but A is not B does not prove that C is not D," because C may be D under many other circumstances besides that of A being B. This form of fallacy is among the commonest, and at the same time most difficult to detect. We may give an example. "If the rails are unsound the railway is unsafe; but the rails are not unsound, therefore the railway is not unsafe," gives a quite invalid conclusion, because there are plenty of other causes than unsound rails (incompetent drivers or signalmen, weak bridges, bad weather, &c.) to render a railway unsafe. Hypotheticals can be readily converted into categoricals. Our present example comes into "All railways with unsound rails are unsafe; this is not such a railway, therefore this railway is not unsafe," an example of the mood *A E E*, which is not admissible in the first figure. Such a reduction to an ordinary syllogism clearly shows the falsity of the reasoning to lie in an illicit process of the major, for the term "unsafe" is distributed in the conclusion, whereas it was undistributed in the major premise. The destructive hypothetical syllogism is of two forms (and curiously enough a negative premise here gives an affirmative conclusion, and an affirmative premise a negative conclusion): these are firstly, "A is either B or C; it is B, therefore it is not C," and secondly "A is either B or C; it is not B, therefore it is C." The first argument sometimes does not hold, because B and C may not be mutually exclusive, and A may be both B and C.

The Dilemma.—Here two alternatives are proposed for choice, and are called the *horns of the dilemma*. It occurs in these forms:—

- I. If A is B, C is D; and if E is F, C is D,
But either A is B, or E is F,
Therefore C is D. (Constructive.)
- II. If A is B, C is D; and if E is F, G is H;
But either C is not D, or G is not H,
Therefore A is not B, or E is not F. (Destructive.)

As an example of the last, Whately's dilemma is classical: "If this man were wise he would not speak irreverently of Scripture in jest, and if he were good he would not do so in earnest; but he does it either in jest or in earnest, therefore he is either not wise or not good."

All arguments have to be closely watched for *FALLACIES*, the principal varieties of which are treated of fully under that heading, and need not therefore be here recounted. The *QUANTIFICATION OF THE PREDICATE* is also dealt with as a separate article on account of its importance. The logic of *INDUCTION* is also elsewhere treated. All therefore that remains here is to give a brief account of the principles underlying Boole's "System of Logic," the work of the late professor of Queen's College, Cork; and of the "logical machine" of Professor Jevons.

Professor Boole endeavoured to show that logic might be studied as a branch of mathematics; and he believed that he could arrive at every possible inference by the principles of algebra. The actual process employed by him is too abstruse and obscure to be made clear in the necessary limits of this work; but it may be summarized as a method of *indirect inference* founded on the three primary laws of thought. For by the law of excluded middle a thing is either A or not-A; iron is either metal or not-metal, either element or not-element, &c. Now take the syllogism, "Iron is a metal, all metals are elements, therefore iron is an element." Here we can regard iron as to the terms metal and element in only four ways, namely (1) metal and element; (2) not-metal and element; (3) metal and not-element; (4) not-metal and not-element. But we are told

that "iron is a metal," which disposes of (2) and (4), and we are told that "all elements are metals," so that (3) combines things which cannot coexist, metals and not-elements. Only (1) is left, whereby iron is a metal and an element. The reader can see that here we have a mode of reasoning stretching very far, including as many terms and propositions as the longest sorites, and workable with the materials of half a dozen syllogisms at once. We may take, as a more complicated example, one of Professor Boole's own arguments. These are the premises:—(1) Similar figures consist of all whose corresponding angles are equal, and whose corresponding sides are proportional; (2) triangles whose corresponding angles are equal have their corresponding sides proportional, and *vice versa*; (3) triangles whose corresponding sides are proportional have their corresponding angles equal. Now we take our symbol letters as follows.—

A = similar figure. B triangle.

C = corresponding angles equal.

D corresponding sides proportional.

And the premises give us $A = C D$, $B C = B D$.

Out of the sixteen combinations formed by A B C D and their negatives $a b c d$ (dissimilar figures, unequal angles, &c.), only the following stand the test of A necessitating C D and B C, B D—the combinations A B C D, $a b c d$, and $a B c d$, $a b C d$, $a b c D$, $a b c d$; whence we draw the following irrefutable conclusions: (I.) Similar figures, whether triangles (A B C D) or not triangles ($a b c d$), have their corresponding angles equal and sides proportional; and (II.) dissimilar figures are triangles which have not their corresponding angles equal nor sides proportional ($a B c d$), or are figures other than triangles which have either their corresponding angles equal and sides not proportional ($a b C d$), or *vice versa* ($a b c D$), or neither the one nor the other ($a b c d$).

Whence Professor Stanley Jevons saw his way to the construction of a perfectly accurate mechanical *logical machine*. In the front of this ingenious machine are sixteen movable wooden rods, carrying the sixteen combinations of A B C D and $a b c d$ (the negatives of A B C D). At the foot are 21 pianoforte keys, the eight to the left being for A B C D, $a b c d$, as subjects of propositions, the eight to the right for the same when used as predicates; a key in the middle operates for the copula, another on the extreme right is for the full stop, another is necessary to bring the whole apparatus to a zero point, ready to begin any new chain of argument, and the remaining two serve for the conjunction *or*, according as it occurs in subject or predicate. The internal construction is such that impossible combinations of letters are rejected by the machine itself, and if the keys be pressed down in the order of the premises, the possible combinations, and only those, are shown and remain in view. The machine does the work mechanically which was performed with some labour in the preceding paragraph. It was first exhibited to the Royal Society on 20th January, 1870, and has since then received various improvements.

Material or Physical Logic.—We find ourselves in a department which touches upon what is more profound, although it is not so susceptible of exact demonstration, when we enter material logic—when we analyze nature in its relations to thought, and with a view to determine the conditions of legitimate inductive generalization. The main features of the methods of material logic will be found in the article *INDUCTION*.

On the whole, then, logic may be described as a system of *rules* which are a universal *formal* and *material* criterion of truth, and which are contemplated by the logician in their practical relation to the employment of thought, and also in their theoretical principles. Logic merges in metaphysics—i.e. in the science of being, or of consciousness,

or science in its first principles. To metaphysics must be referred all the ultimate questions about the natural or sensible world in which we find ourselves, and to which our physical reasonings relate.

Logic, strictly to be so called, thus terminates *face to face* with a problem resembling that which engages the Hegelian logician throughout, and which the Hegelian professes to solve. To ascertain by reflection the appearances really given in consciousness, and our genuine or defensible regulative beliefs concerning them, and to distinguish these last from accidental or unreasoned associations of ideas, is the task to which it addresses itself, as it tries to recover the actual facts of our conscious life from the grasp of abstractions, and in so doing nourishes reverential feeling and religious faith in the contemplation of the ultimately unknowable by which we are encompassed on every side.

In the narrow compass of this article only a faint outline of the logical province, with its principal divisions and relations, has been attempted. The large recent development of logic, and the intellectual activity of which this is at once a cause and an effect, make it impossible in a few sentences to unfold scientific details, which are the reward only of the long-continued, patient, and systematic study through which this science awakens thought, and thus constitutes an invaluable and indeed indispensable organ in academical education. The best text-books on logic are the splendid work of John Stuart Mill (eighth edition, London, 1872), and Hamilton's "Lectures on Logic" (London, 1860); for fallacies, De Morgan's "Logic" (London, 1847) and Whately's (fifth edition, 1864) are useful; for general habits of logical thought Locke's famous essays are invaluable (first published 1690 and 1706). The new (mathematical) logic is contained in Boole's "Mathematical Analysis of Logic" (London, 1847), and Professor Stanley Jevons' "Principles of Science" (London, 1874). Of the smaller books Jevons' "Elementary Logic" (London, 1884) is incomparably the best, and contains all that students require for anything short of professional research.

LOGWOOD, a valuable dyewood, is the product of a tree (*Hæmatoxylon Campechiannum*). This tree is one what like our native Hawthorn, growing to between 20 and 30 feet in height, and often as much as 5 or 6 feet in circumference. It belongs to the order *LEGUMINOSÆ*. The leaves are pinnate, with racemes of yellow flowers produced from their axils. The pod is flat, contains two seeds, and opens by bursting irregularly on the sides. Logwood is a native of Central America, being first discovered in the Bay of Campeachy. Its use was forbidden in England by an Act of Parliament passed during the reign of Queen Elizabeth. The Act sets forth "that logwood or blackwood, of late years brought into this realm, is expressly prohibited to be used by dyers, the colours thereof being false and deceitful to the queen's subjects at home, and discreditabie beyond seas to our merchants and dyers." The failure of the dyestuff was probably due to ignorance of the proper mordants, for when the Act was repealed in 1661, it is stated "that the ingenious industry of these times hath taught the dyers of England the art of fixing colours made of logwood, so that by experience they are found as lasting and serviceable as the colour made with any other sort of dyewood." The consequence of the removal of the injunction was that logwood was eagerly sought after, and a few Englishmen from North America settled in a remote part of Yucatan, and began felling and exporting it. The Spaniards had two or three small settlements in the province, and for more than 100 years there were constant acts of hostility between the settlers of the rival nations. For this reason it was introduced in 1715 into Jamaica by means of seed, and succeeded so well that it soon became thoroughly naturalized, and is even planted for hedges. The wood is hard enough

to take a fine polish, and is very durable. The heartwood is of a dark reddish colour, having a violet-like odour, and a taste at first sweetish, afterwards astringent. Its principal use is for dyeing woollen goods, and it is generally used in combination with other dye-stuffs; for instance, to produce "wooded blacks" on wool, it is first dyed blue with indigo, and then finished black with logwood and bichromate of potash. Logwood is occasionally used medicinally. It acts as a mild astringent in hæmorrhages or increased secretions; and in some forms of diarrhœa it often effects a cure where more powerful astringents fail. The infusion is preferable to the extract.

LOHENGRIN or **LOHERANGRIN** was, in Teutonic legend, the son of Percivale, one of the Knights of Arthur's Round Table, and guardian of the Holy Grail. A vision seen by all the knights consecrated the young knight to defend the rights of the innocent wherever they might be; and he was to be driven to his destination in a boat by a white swan, which bore a crown on its neck. He was forbidden to tell his family or origin, and if ever asked for them was bound to return to the Holy Mountain and his father Percivale (or Parsifal). Armed in silver armour, and aided by a magic horn, he was sent forth.

The most famous adventure of Lohengrin is that chosen by Wagner in his famous drama (opera), where he comes to the succour of the persecuted Else, duchess of Brabant, whose honour he sustains in single combat, so that he wins not only her cause but her heart. Unfortunately Else, on their bridal night, is tempted by her enemies to ask Lohengrin for particulars of his mysterious dwelling-place. As the thought was not her own she is forgiven, but loses her husband, who sails away in his swan car as he came. Her death, which follows soon after, is hailed by her as a sign that she shall regain the bright champion and see the Grail herself. There are many explanations offered of this supposed allegory; but after all it may only be a graceful imaginative legend, guiltless of the dark mystic meaning that is sought to be read into it.

LOIRE (the *Liger* or *Ligeris* of the Romans), a river in France, the basin of which is bounded E. by the Cévennes; N. by the mountains of Morvan, the heights of Beauce, and the Menez Mountains; and S. and S.W. by the Massif Central, and the volcanic group of Auvergne, with its ramifications westwards to the Atlantic. The limits thus described include a fourth part of France. The greatest length of the basin from north-west to south-east is 370 miles; its greatest breadth, 224 miles. Its area is estimated at 50,783 square miles.

The Loire rises in Mont Gerbier-des-Joies, one of the Cévennes, in the neighbourhood of Mont Mézin, in the department of Ardèche. The general direction of its course is at first north, then north west to Orléans, where it turns westward, and continues in this direction to its entrance into the Atlantic 36 miles below Nantes. The number of streams received by the Loire is very great; its navigable feeders from the right bank are the Arroux, the Maine (formed by the junction of the Mayenne and the Sarthe); from the left—the Allier, the Loiret, the Cher, the Indre, the Vienne, the Thouët, the Sèvre Nantaise, and the Aulouarn, all of which, with their feeders, give a total amount of internal navigation of about 1300 miles. In the upper part of its course, above the junction of the Allier, the valley of the Loire is narrow. At its source the Loire is about 4600 feet above the sea-level; below Nevers, at its junction with the Allier, 550 feet; at Orléans, 294 feet; a little below Tours, 160 feet; at the junction of the Mayenne, 115 feet; and at Nantes, 83 feet above the sea-level. The whole course of the Loire is about 690 miles, of which 505 are navigable.

This river, with its larger affluents, constitutes the great outlet for the produce of central and western France. The banks are celebrated for their beauty, particularly in the

neighbourhood of Tours. From the melting of the snows in the Cévennes, in which it has its source, the Loire is subject to great inundations, to prevent which it has been embanked in the level tracts below Orléans. [See INDRE-ET-LOIRE.] The Loire is connected with the Saône by the Canal du Centre, with the Seine by the Canals de Bièvre, d'Orléans, and du Loing, and with Brest harbour by the canal from Nantes to Brest.

The district watered by the Loire occupied a very prominent part in the Franco-German War of 1870–71. Nearly all the towns in the several departments named after it were occupied by the invading armies of Germany. Heavy exactions were levied from them, and they underwent the severest horrors of war, including, in several cases, bombardment. It was also from the Loire districts that, after the fall of the empire, the most formidable of the republican forces were raised, for although ultimate success was wanting, the celebrated Army of the Loire inflicted vast losses and annoyance upon the invader.

LOIRE, a department in France, comprising the greater part of the district of Forez, is bounded N. by the department of Saône-et-Loire, E. by those of Rhône and Isère, S. by those of Ardèche and Haute Loire, and W. by those of Puy-de-Dôme and Allier. It extends from 45° 13' to 46° 17' N. lat., and from 3° 41' to 4° 15' E. lon.; its greatest length is 77 miles, and its average width about 29 miles. The area is 1838 square miles, and the population in 1881 was 592,836.

Surface.—The department belongs almost entirely to the basin of the Loire, which is separated from that of the Rhône by the Cévennes Mountains on the east, and from that of the Allier by a secondary chain of the Cévennes Mountains on the west. The interior may be described as two large inclined planes descending from these two mountain ranges, and intersecting in the water-line of the Loire; but as the mountains, in their course northwards, trend off respectively in directions nearly N.N.E. and N.N.W., the northern portion of the department has more the appearance of a single wide plain, which includes part of the former provinces of Beaujolais and Bourbonnais, and is called the plain of Roanne. The rest of the department is called the plain of Forez; and between it and the plain of Roanne the division is marked by a chain of hills running east and west, and uniting the two mountain ranges before named, except at the point where it is broken through by the Loire. A small portion of the south-east of the department extends eastwards of the Cévennes into the basin of the Rhône, which river runs along the boundary for about 6 miles. In the western part of the plain of Forez several isolated volcanic swells, consisting of black basalt, lie in a general direction of north and south, and have their summits crowned with the ruins of ancient castles or monasteries.

Rivers.—The principal rivers are the Loire and the Rhône, by means of which the various industrial products of the department are conveyed to the Atlantic or to the Mediterranean. The Loire is navigable, in its whole length, in this department, to which it gives name; but owing to the rapidity of the current, it is only the down navigation that is available as far as Roanne, where the general navigation of the river commences. Its principal feeders are the Ondene, the Furens, the Coise, the Lignon, and the Sornin. The Gier is the only feeder the Rhône receives in this part of its course. The lateral canal of the Loire from Roanne to Digoin runs through the north of the department; another canal connects Rive-de-Gier with the Rhône. A railway passes along the right bank of the Loire, from Roanne to St. Étienne, near which it crosses the Cévennes, and continues up the valley of the Rhône to Lyons; its length is 79 miles.

Products and Manufactures.—The mountains of the Loire abound with excellent pasture and medicinal plants;

their lower slopes are cultivated or covered with vineyards and chestnut woods. In the plains the common bread-stuffs are grown, but in quantity insufficient for the consumption; hemp, excellent fruits, oleaginous seeds, and dyestuffs are also raised. About 6,000,000 gallons of good red and white wines are produced annually. Horses and black cattle are small; the sheep are noted for their sweet flesh; poultry and game are abundant. In the valley of the Rhône mulberry trees are extensively grown for the production of silk. There are also extensive forests of pine, fir, beech, and oak; on Mont Pilat, near St. Étienne, an immense number of deals are made, saw-mills being established on every available stream of water. But much of the finest pine timber is made into charcoal, in consequence of the great difficulty of transport from the mountain heights on which it grows; the finest trees vary from 98 to 115 feet in height. Great quantities of chestnuts are grown; these enter largely into the food of the people; the finest are sent to Paris, where they are sold (like those of Ardèche) under the name of *marrons de Lyon*.

The department contains one of the richest coal-beds in France, which besides feeding the numerous factories and furnaces of St. Étienne, and other places in the department, furnishes large quantities for exportation to Lyons and the towns on the Rhône. The quantity of coal annually furnished by the mines of Loire amount to one-third of all the coal raised in France. Lead and iron mines are also worked; building stone, granite, potter's clay, &c., are found; mineral springs are numerous.

The manufactures are of the greatest variety and importance, and give rise to a very extensive commerce. The chief products are firearms, ironmongery, and machinery of all kinds, silks, ribbons, crape, velvet, plush, laces, linen, cotton, glass, bricks, steel, iron, scythes, hardware, canvas, mill-castings, files and tools of all descriptions, cotton and linen yarn, lace, cutlery, earthenware, tiles, lime, &c. Great numbers of coal barges and canal boats are built at Roanne and St. Rambert. The chief centre of the manufacturing industry is St. Étienne.

The department contains 1,176,900 acres, and is divided into the three arrondissements of Montbrison, Roanne, and St. Étienne.

LOIRE, HAUTE, a department in France, comprising the district of Velay and parts of Gévaudan, Forez, and Auvergne, takes its name from its situation in the upper part of the basin of the Loire, and is bounded N. by the departments of Puy-de-Dôme and Loire, E. by Ardèche, S. by Lozère, and W. by Cantal. Its greatest length from E. to W. is 69 miles, from N. to S. 46 miles; it extends from 41° 41' to 45° 25' N. lat., and from 3° 4' to 4° 26' E. lon. The area is 1925 square miles, and the population in 1881 was 316,461.

Surface and Hydrography.—The department is mountainous. The Cantal Mountains, and the Margeride chain, which unites them to the Cévennes, cover with their offshoots so much of the south-west and south of the department as lies on the left bank of the Allier; the south-eastern and eastern districts are occupied with the mass of the Cévennes, from which a secondary chain, running through the interior nearly north and south, forms the watershed between the Allier and the Loire, and is joined, near Chaise-Dieu, by another range that runs north-west from Mont Mezenc, the culminating point of the Cévennes. [See CÉVENNES; ARDÈCHE.] The country, thus surrounded and traversed by mountains, is furrowed by numerous rivers, brooks, and torrents, which flow with rapid descent, either between steep banks that expose to view the volcanic formation of the rocks, or through picturesque and fertile valleys whereof the soil consists of decomposed lava and other volcanic deposits. On the mountains, which present numerous conical peaks and craters, and have their summits covered with snow during five or six

months in the year, there are large forests and extensive pastures, where great numbers of cattle and mules, the chief wealth of the country, are reared. The lower slopes are covered with chestnut woods and vineyards. In the north-west and north-east of the department there are some extensive plains of considerable fertility, all covered with a soil of decomposed volcanic matter.

The principal rivers are the ALLIER, which drains the west of the department; and the LOIRE, which, swelled by the Gazeille, the Lignon, and the Somme from the right bank, and by the Borne, the Arzon, and the Ane from the left, drains the central and eastern districts.

Products and Manufactures.—The agricultural produce is generally sufficient for home consumption. The usual crops are wheat, rye, barley, oats, meslin, beans, &c.; fruits are abundant. The wine is of inferior quality. Mules are reared and horned cattle and pigs are fattened in great numbers. Among the wild animals are bears, wolves, foxes, wild cats, badgers, &c.

The geological structure and mineral wealth of the department are of great variety, though the latter is not turned to much advantage. The mountain-range which runs north-west from Mont Mezenc consists of trachytic rocks, and is reckoned among the most ancient of the volcanic structures of Central France. The district of Velay, which lies south and south-west of this range, and comprises nearly all the south of the department, is occupied with basaltic rocks and lava beds, the great antiquity of which is proved by their being covered with a soil formed by the decomposition of their surface. Along the banks of the rivers in this district the basaltic columns laid bare to view assume a variety of beautiful forms; and the charred fragments of ancient eruptions, which were long subsequently rolled and worn in watercourses that have disappeared for ever, are seen in many places deposited in beds of clay and marl, piled up alternately one upon the other. Among the primitive rocks are found granite, gneiss, quartz, mica schist, &c. Coal, lead, and antimony mines are worked; iron and copper ores are found at various points. Chalcedony, diamond-spar, sapphires, amethysts, tourmalines, &c., are found, and also marble, millstone grit, plaster of Paris, &c. Mineral springs are numerous: they are all saline or acidulous.

The manufactures consist of common articles of necessity and use, and are unimportant, with the exception of silk and thread lace and ribbons. The people are in general poor, and many of them emigrate during the winter months as sawyers, hawkers, porters, sweeps, &c.

In a country the highest point of which, Mont Mezenc, is 5820 feet above the sea-level, while its lowest point, namely, where the Allier crosses the northern border, is only 1279 feet above the same level, there is room for very great variety of climate and season. Seed-time and harvest differ in different cantons according to the elevation, the maximum variation amounting to as much as two months; and such is the difference of climate, that while in some districts the vine flourishes, in others rye will hardly ripen. The south-west wind blows at times for weeks continually, and with great violence.

The department contains 1,232,000 acres, and is divided into the three arrondissements of Le Puy, Yssengeaux, and Brioude.

LOIRE INFÉRIEURE, a department in France formed out of a part of Bretagne, and lying along the lower course and the mouth of the Loire, is bounded N. by the departments of Morbihan and Ile-et-Vilaine, E. by those of Mayenne and Maine-et-Loire, S. by that of Vendée, and W. by the Bay of Biscay. It extends from 46° 52' to 47° 52' N. lat., and from 0° 55' to 2° 32' W. lon.; its greatest length from east to west is 74 miles, from north to south 69 miles. The area is 2632 square miles, and the population in 1881 was 625,625.

Surface and Hydrography.—The coast-line is about 55 miles in length. It presents an irregular outline, broken in the north by the bays of Pennebe and Penbron, which are separated by the promontory of Piriac; in the centre by the embouchure of the Loire, to the north of which are some small islets; and in the south by the large Bay of Bourgneuf. Considerable salt marshes lie along the coast. The surface of the department is level, with the exception of a line of low hills, which crosses it in the north, forming the watershed between the Loire and the Vilaine. The principal river is the Loire, which enters the department below Ingrande in Maine-et-Loire, and divides it into two unequal parts. It is 5 miles wide at its mouth, and is navigable for large vessels up to Nantes, to a few miles above which the tide ascends. The principal feeders of the Loire in this department are, from the left, the Sèvre-Nantaise and the Achenau, which last is the outlet of the Lake of Grand-Lieu; from the right, the Erdre, which enters the Loire at Nantes. The Vilaine touches the department on the north-west, receiving the Don and the Isac. The other most considerable rivers are the Maine and the Moine, feeders of the Sèvre-Nantaise; the Ognon and Boulogne, which flow from Vendée into the Lake of Grand-Lieu; the Brivé, which enters the Loire above St. Nazaire; and the Tenu, a feeder of the Achenau. The department is crossed by the canal from Nantes to Brest. The climate is healthy, although somewhat damp; the heat in summer is often very great.

Grand-Lieu, the largest lake in France, and the reservoir for the waters of the Boulogne, the Ognon, and some smaller streams, is situated near the left bank of the Loire, with which it has communication by its navigable outlet, the Achenau. It has an area of 29 square miles, and abounds in fish; its shores are marshy. North of the Loire there lie many small lakes and extensive marshes and bogs.

Products.—The quantity of cereals produced suffices for home consumption. The chief crops of this kind are wheat, rye, buckwheat, and meslin. Barley is grown in small quantity. The meadows and pastures along the Loire, in the islands formed by the deposits of the river, and in the neighbourhood of the marshes, are excellent. Cattle of good breed are very numerous; horses, of which also great numbers are reared, are small. The apple tree is extensively cultivated north of the Loire for making cider, and in the same district there are forests of vast extent. The *Bocage* district, which stretches south-east of the Lac du Grand-Lieu, is well wooded, as the name implies, every field being inclosed with hedgerows and lines of timber trees. The vineyards of the department yield 32,000,000 gallons of wine annually, rather less than a third of which is used for the home consumption; of the surplus, part goes to the supply of Paris, some is distilled into brandy, and the rest is sent to Orléans to be converted into vinegar. The wines are considered of middling quality; the sweet ones are prized for their agreeable flavour, and for their keeping qualities. The country on the south bank of the Loire is much superior to that on the north, and is nearly all under culture.

Granite, quartz, mica, kaolin, and felspar are found in the arrondissement of Nantes; in that of Châteaubriant extensive slate quarries are worked, and iron ore is abundant, supplying many forges, blast-furnaces, and foundries. In the arrondissements of Châteaubriant and Ancenis there are important mines of coal of excellent quality; magnetic iron is found in isolated particles on the surface of the ground on the right shore of the embouchure of the Loire. There are mineral springs and sea-bathing establishments at Plaine and Pornic.

Manufactures and Commerce.—The principal manufactures are linen, calico, printed cotton, serge, and coarse woollen stuffs; shipbuilding is carried on at Nantes, Paim-

bœuf, and Pellerin; and at Indret, one of the small islands in the Loire, there are establishments for the manufacture of steam-machinery, and also slips for building steam-vessels. Other articles of industrial produce are paper, leather, porcelain, glass, ship cordage, chain cables, cotton yarn, refined sugar.

The department has an important commerce with foreign countries, coastwise, and with the interior. The principal articles of trade are wine, brandy, fruits, salt (of which a vast quantity is made along the coast), hardware, oil, provisions, soap, wool, and other French and colonial produce. Ships are fitted out for the herring and cod fisheries, and the mackerel and pilchard fisheries along the coast are actively plied.

The department contains 1,684,588 acres, and is divided into five arrondissements—viz. Nantes, Ancenis, Châteaubriant, Paimbœuf, and St. Nazaire. The capital is NANTES.

LOIRET, a department of France, formed out of the eastern part of the province of Orléanais and a small part of Berry, lies between 47° 29' and 48° 20' N. lat., and 1° 32' and 3° 5' E. lon., and is bounded N. by Seine-et-Oise and Seine-et-Marne, E. by the department of Yonne, S. by those of Nièvre, Loir-et-Cher, and Cher, and W. by Eure-et-Loire. Its greatest length, from east to west, is 72 miles, and its average breadth, from north to south, is 42 miles. The area is 2578 square miles, and the population in 1881 was 368,526.

Surface and Hydrography.—The department is divided into two unequal parts by the Loire. The district situated south of this river is part of the old district of Sologne [see CHER], and presents a barren sandy soil, covered with heath, but here and there swelling into hills, which are planted with vines, yielding red and white wines of moderately good quality. The district north of the Loire is composed of fertile and well-cultivated plains, separated by wooded hills, and diversified by extensive forests, rich meadows, and pasture lands. A chain of hills that forms part of the watershed between the Seine and the Loire traverses the department from south-east to north-west, at no great distance from the right bank of the Loire, which river crosses the department in the same direction as far as Orléans, where it sweeps round to the south-west.

The department takes its name from the Loiret, a little river that rises all at once in full flood from a spring in the park of Château-de-la-Sourde, a few miles S.E. from Orléans, and flowing westwards enters the Loire on the left bank after a course of 7 miles. The waters of the Loiret never freeze, owing to the high temperature which they have on issuing from the earth, and to the shortness of their course. The Duis, a sluggish muddy stream, is the principal feeder of the Loiret; before its junction with the latter it enters a whirlpool, by which part of its waters are generally absorbed, the remainder being conducted to the Loiret by a short canal. But at certain seasons of the year, when the waters of the Loiret are highest, a portion of them ascends the canal and enters with the Duis into the whirlpool, which is said to have an underground communication with the Loire. When the waters of the Loire, however, rise above their usual level the whirlpool then, instead of absorbing the waters of either river, overflows and adds considerably to their quantity. The Loiret is navigable almost from its source; it drives the machinery of several mills and factories. The Loing, which receives the Ouanne and several other feeders, flows north through this department from that of Yonne on its way to join the Seine. The north-western districts are drained by the Essonne, which flows north and enters the Seine in the department of Seine-et-Oise. The department possesses great advantages from internal navigation by the Loire and by the Canal d'Orléans and the Canal de Briare, which unite near Montargis, whence the Canal du Loing runs northward into the department of the Seine-et-Marne, and passing Nemours enters the Seine near

Moret. The department is also traversed by the Paris-Orléans, the Orléans-Nantes, and the Orléans-Bourges railways.

Climate, Products, and Resources.—The climate is mild and healthy; the prevailing winds are the west and south-west. The district north of the Loire is very productive of rye and other breadstuffs, but owing to the infertility of the Sologne district the produce is little more than enough for the consumption. Yet the department has a most important trade in corn, which, however, is supplied from the great wheat districts of Beauce, Poitou, Anjou, and Lower Auvergne, and finds easy distribution from the great granaries of Orléans, by the means of transit before mentioned, to different parts of France. The quantity of oats grown is enormous. Saffron is extensively and profitably cultivated. Asparagus and other pot-herbs are raised in large quantities. About 20,000,000 gallons of wine are made annually, of which about one-fourth goes to the home consumption; most of the remainder is exported under the name of Vins d'Orléans, generally of ordinary quality; some is retained for making vinegar. Apple, pear, and all fruit-trees common to the north and centre of France are successfully cultivated, and a great quantity of preserves are made. The forests contain chiefly oak, beech, birch, elm, and chestnut. Cattle are of good breed, and also sheep, except in the Sologne, where they are small but well fleeced. Bees are carefully tended; game, poultry, and fish are abundant. Building and lime stone, marl and potters' clay are the only minerals found. The manufactures, except those of Orléans, are unimportant, but the commerce of the department is very extensive. The chief articles of trade are corn, flour, wine, brandy, vinegar, groceries, drugs, fruits and fruit-trees, pease and beans, chestnuts, cider, fish, honey, saffron, salt, wool, firewood, oak-staves, charcoal, cattle, &c.

The department contains 1,649,933 acres, and is divided into four arrondissements, viz. Orléans, Pithiviers, Gien, and Montargis. The capital is ORLÉANS.

The Loiret suffered more severely than any other department of France during the war of 1870-71. It was the scene of the operations of contending armies almost without intermission from the time of the investment of Paris in September, 1870, to the close of the war in February, 1871. There is not a single town or village over which the tide of invasion did not roll. The heroic efforts of the inhabitants in raising and sustaining the celebrated Army of the Loire drew down upon the department the especial vengeance of the enemy. Its fertile plains were desolated by German requisitions, and to expel the invader the towns had more than once to submit to the horrors of bombardment from their own defenders. The scenes of war only shifted to the department when France may be said to have been fighting to maintain its integrity and position as one of the great powers of Europe; and the devoted patriotism of the people of the Loiret, and the superhuman efforts they put forth to retrieve their country's disasters, are among the most honourable and, to Frenchmen, consoling features of the war.

LOIR-ET-CHER, a department in France, formed chiefly out of the old province of Orléanais, is bounded N. by the department of Eure-et-Loir, E. by those of Loiret and Cher, S. by that of Indre, and W. by Indre-et-Loire and Sarthe. Its length from north-west to south-east is 78 miles; the average width is about 30 miles. The area is 2452 square miles, and the population in 1882 was 275,713.

Surface and Rivers.—The surface presents numerous elevated and extensive plains, unbroken by any considerable hills, and sloping gently to the south-west. The department is divided into two pretty equal parts by the Loire, along the banks of which run two chains of low hills, that have their slopes covered with vineyards and orchards. The district north of the Loire is drained

by the Loir, which, rising in the south-west of Eure-et-Loir, flows south-east as far as Bonneval, and thence nearly south past Châteaudun to Vendôme, in this department. From Vendôme it runs nearly west, crossing the south of the department of Sarthe, and, reaching the boundary below La Flèche, it enters the department of Maine-et-Loire, taking a south-western direction to its junction with the Sarthe on the left bank, nearly opposite the point where that river is joined by the Mayenne, about 5 miles north of Angers. The principal feeders of the Loir are the Ozane, the Yère, and the Braye on the right bank, and the Conie on the left. The whole length of the river is about 160 miles, 65 of which are navigable. The district south of the Loire is drained by the Cher, its feeder the Sauldre, and by the Beuvron and Cosson, which throw their waters into the Loire, near the village of Candé, below Blois. There are numerous ponds along the left bank of the Loire; and the south-east of the department, which is formed out of part of the old district of Sologne, now included in the arrondissement of Romorantin, presents a vast marshy plain. The department is crossed by the Orléans-Tours Railway, which runs through Blois and along the right bank of the Loire; and by the Orléans-Vierzon line, which has 32 miles of its length in the south-east of this department.

Soil and Products.—The soil in the north-east, which includes a portion of the Beauce district, consists of a dark rich loam; in the south-east the arable land is composed of strong clay and sand; along the Cher the soil is calcareous. Agriculture is in a forward state; large quantities of bread-stuffs are raised, much larger than are required for home consumption. Of wine, the annual produce is about 13,000,000 gallons, a large portion of which is distilled into brandy. The department yields, besides excellent fruits and vegetables, beet-root, hemp, &c. The Sologne sheep are extolled for the fineness of their wool; but the horses of that district, though hardy, are small and ill-formed. Black cattle are of inferior breed. The arrondissement of Vendôme is famous for its breed of draught horses. The rivers and ponds abound in fish; the Sologne marshes and ponds supply also a considerable quantity of good leeches. The department contains a good deal of natural and artificial grass-land; and in the arrondissement of Romorantin there are large pine woods. The climate is in general mild and healthy, except in the marshy district of Sologne.

Iron mines are worked; alabaster, building stone, and gun-flints are quarried; marl and potter's clay are found. The manufactures consist of coarse woollens, blankets, swanskin, cotton cloth, hosiery, leather gloves, beet-root sugar, woollen yarn, leather, glass, and earthenware. The area of the department is 1,569,000 acres, and is divided into the three arrondissements of Blois, Romorantin, and Vendôme. The capital is Blois.

LOKI, in the Norse mythology, is the god of fire; and as fire is the craftsman's element, he is the crafty cunning worker, and, like fire also, is he treacherous and unstable, capable of much evil when unrestrained. By the giantess Anguish (Angurboda), he is father of Hel, goddess of the under-world, of the Fenris-wolf, and the Midgard Snake, who are to play such great parts in the final destruction of the world. At first, brother of Odin the All-Father, the Teutonic Zeus, Loki was the beneficent god of warmth, and especially of the household fire. But as in those old days a neglected smouldering mass of ashes frequently caused the horrors of conflagration and ruin of the family house, so the conception of Loki as developing into a treacherous and mischievously destructive god arose. He was held to be the corrupter of the gods, and to be the embodiment of evil, somewhat after the type Goethe has chosen for his Mephistopheles in "Faust."

The most famous myth relating to Loki is that of the

death of the bright Baldur (sun-god), darling of the Ases (gods). In spite of all their loving care Loki found means to compass Baldur's death by means of the mistletoe, neglected for its weakness, from which, however, he managed to get an arrow stout enough for his purpose. [See BALDUR.] Characteristically enough, Loki does not commit the crime himself, but cheats another into doing it. In the end Loki is tracked through all his transformations and disguises, and brought to judgment for his wickedness. He is condemned to be bound prostrate to a rock, his face uppermost, and a poisonous adder resting on the stone above drops poison perpetually into his eyes, causing him unspeakable torment. His second wife, Sigyn, long treated by him with cruelty and neglect, is the only one to succour him. She catches the poison in a cup; but when she turns aside to empty the cup as it grows full the torment begins, and the mighty god, in his anguish, strains at his bonds and roars. This is what men call an earthquake.

The name Loki comes from *liúhen*, to glow, to light up; and is of the same root as *lux*, the Latin of light. In one of Loki's numerous adventures he takes refuge in the water, a strange thought at first until the dazzling glare of a sunlit sea is remembered to be one of the most trying forms of natural heat.

LOKMAN', a semi-mythical personage to whom some famous Arabic fables are attributed. He is by many identified with the Greek *Asiops* or *Asop*, whilst the Arabs themselves say he was a nephew of Job, or some say of Abraham. According to other Arabs he was a friend of Solomon. Mohammed quotes Lokmán in the Korán (Sura xxxi.) as the embodiment of wisdom—"We heretofore bestowed wisdom on Lokmán," &c. Further on he cites him for his pure monotheism—"Lokmán said unto his son: O my son, give not a partner unto God; to believe in many gods is an impiety." Arab writers in general make Lokmán an inspired prophet, and even credit him with refusing the kingdom of this world when divinely offered him, as likely to interfere with his spiritual happiness. The fables represent in this account the practical side of his wisdom.

The fables of Lokmán are, by origin, part of the celebrated Indian fables, and in their present form are certainly derived from Greek versions. The Arabic is not of the best period, in fact it is comparatively modern—probably of the thirteenth century—but as the fables are jolly and short they are used as a first reading book in Arabic.

LOK'RIAN, or LOCRIAN, MODE, in ancient Greek music, was the same as the hypodorian, i.e. the scale which we can make of white notes on the organ or pianoforte between F and E, regarding A as the keynote, and running therefore from dominant to dominant.

In the ecclesiastical pseudo-Greek naming of the modes used in the dark ages, Lokrian was the name sometimes given to the scale from B to B; hardly ever used, because of the inadmissibility of F as its dominant, as being a tritone from the tonic. Scarcely any music exists in it, and what there is could as well be written in another mode. G is usually used as the dominant.

LOK'RIANS, an ancient people of Greece. They dwelt in Lokris, the strip of sea-coast opposite the island of Eubœa, extending from Thermopylæ to Boœtia, their capital being Opous. They were called the Opuntian Lokrians, to distinguish them from their western and less civilized kindred, the Ozolian or Ætolian Lokrians, who dwelt between Ætolia and Phœkis, on the northern shore of the Corinthian Gulf, and whose chief town was Amphisra. The latter was originally a colony of the former; and both, though dwelling on the mainland of Greece, were regarded as not truly Hellenic peoples.

LOLLARDS, a religious sect which rose in Germany at the beginning of the fourteenth century, and differed in many points of doctrine from the Church of Rome, more

especially as regards the mass, extreme unction, and atonement for sin. The name seems to be derived from the German *lollen*, "to sing lullingly," and *hard*, a common affix. Hence, a Lollard was one who sang the praises of God. Lollard subsequently became a term of reproach for all heretics, who were supposed to conceal erroneous doctrines under the appearance of piety, and especially was it the nickname for the Fraticelli, Beghards, and other offshoots from the great Franciscan order, striving in earnest and even fanatical reaction to check its now rapid degeneration from the poverty and asceticism enjoined by its founder.

When Wyclif arose in England his teaching was so much of this type that the nickname of Lollard was at once fastened upon his followers by the orthodox. Wyclif was a reformer of the Franciscan type, utterly opposed to the proud pretensions of the papacy, aiming rather at individual purity of life and freedom of conscience. Within ten years of Wyclif's death Lollardism was at its height in England; and it is admitted by Catholic historians of that time that nearly half the kingdom was Lollard in tone. The great organization of poor preachers which Wyclif had started bore fruit, quite after the original Franciscan type; and the universities, especially that of Oxford, and the townsmen, especially those of London, assisted this preaching movement liberally, with encouragement both of teaching and of money.

We know from the petition for church reform which the Lollards presented to Parliament in 1395, what were the aims of these fourteenth-century Puritans. They protested against the wealth of the clergy on the ground that riches drove out the Christian graces from the church; they asserted that the commission given by Christ to his disciples was not fulfilled by the terms under which priests served in the church (the Church of Rome was then the only Western Church); that celibacy was a source, not of purity, but of vice; that transubstantiation, or actual change of the wafer and wine in the mass to the very body and blood of Christ, was not true, and that its teaching ought to be stopped; that prayers for the dead were vain; that the church courts should be subject to the king's jurisdiction; that many trades, such as the goldsmith's art, &c., were mere means for luxury which led to the weakening of religious life, and should be prohibited. (Other points condemned by the Lollards were auricular confession, the granting of indulgences, the worship of images, and pilgrimages; and great insistence was laid upon the necessity of teaching by sermons, &c., on the part of the priests.)

King Richard II. dreaded so radical a petition, and from favouring the Lollards now turned against them. When he fell and Henry of Lancaster came to the throne Lollardism had already begun to decline. The new king was unable to dispense with the proffered aid of the church to help to secure his throne, and the price he paid was a terrible one—no less than the statute *De Heretico Comburendo* (1409). The first to burn for Lollardy was the priest "Sir" William SAWTREY. The Archbishop of Canterbury (Arundel) then turned upon Oxford, forbade preaching there without a bishop's license, and made a mid after Lollard books and copies of Wyclif's Bible. While Oxford was still thus suffering he attacked the Lollard nobility, and Sir John Oldcastle (Lord Cobham in right of his wife) suffered much persecution, ending with the terrible death at the stake itself. As many Lollards held that all war was sinful Oldcastle's judicial murder passed without very great excitement, for this was the time of the great French campaigns of Henry V.

In Scotland the University of St. Andrew's shared the persecution of Oxford; and as the "blood of the martyrs is the seed of the church," so a vigorous outgrowth of Lollardism followed. Knox was fond of pointing to the Lollards of Ayr as in especial forerunners of the great Reformation.

Lollardism had to all appearance died down by the end of the fifteenth century, but such awakenings never truly die, they but cease to manifest themselves in their old shape for a time. If it were only that the great movement had familiarized England with a Bible in the vernacular, it had done enough to prepare the ground for the rupture with Rome, which followed a century later, in the guise of the Reformation of Luther.

LOLI'GO. See **SQUID**.

LOMBARD STREET derives its name from the Lombard merchants, the great usurers of the thirteenth century, who appear to have settled in England before the year 1274, and took up their first residence in this street. They long kept up their connection with the wealthy Italian republics, and played the chief part in the exchanges of the time. The pre-eminence of the Medici family at Florence caused the London Lombards to adopt very frequently the *palle* (three golden balls) of this house as their sign or device (in which some antiquaries see the gilded *pills* of the physicians, *medici*), whence the familiar sign still hung out over money-lenders' and pawn-brokers' establishments. Edward III., in 1338, owed no less than £5,000,000 of our present value to the Florence bankers, negotiated through the London houses; and what is more, never paid a penny of that large sum.

LOMBARDIC ARCHITECTURE. This style of architecture may be considered the generic style which prevailed after the extinction of the Roman until the appearance of the Pointed or Gothic. It is the intermediate link between them. Though we are accustomed to regard the Lombardic historically as a distinct style, it was in fact only a further development of the system introduced during the decline of Roman architecture, which applied small orders merely as decoration, and introduced tiers of arches of which the piers form the solid supports of the structure.

Whether forming porticoes and galleries, or applied merely as decoration, these arcades are generally small in proportion to the building itself, and instead of occupying the entire width of the front, or other elevation, are mostly inserted into distinct compartments of it, and are slightly recessed within the general face of the wall.

Among the other peculiarities of this style, that arising from small open galleries immediately beneath the cornice or roof is too remarkable to be overlooked, especially in gable fronts, where the arches of such galleries follow the slope of the roof itself, the columns being successively elevated one above another on steps (so that the bases of those supporting the centre arch are above the lower arches), or else by placing the columns on the same horizontal line, and gradually increasing their height, as in the front of Pisa Cathedral. To this may be added the very prevalent custom of making an upper cornice or border of very small interlacing arches, or rather of mouldings producing that appearance. Pinnacles are of rare occurrence, and when introduced are generally low, and somewhat resemble pedestals. The cathedral of Zara, in Dalmatia, built (1192-1204) by the Doge of Venice, Enrico Dandolo, during the Venetian supremacy, is another very noble specimen of the style; perhaps excelling Pisa in one particular, namely, the way in which, by reducing the arcades to decorative panelling and separating the central design from the ends of the aisles, the awkwardness of the sloping roof-line is overcome. These two typical examples will be found in the Plate illustration of the article prefixed to this volume.

LOMBARDS or **LONGOBARDS**, a nation of ancient Germany, mentioned by Tacitus as a tribe of the Suevi. They lived originally west of the Elbe round about the river Saale, but afterwards crossed over to the east of the Elbe, towards the shores of the Baltic Sea. The Latin name *Longobardi*, whence the Italian *Lombardi*, means of

course Long-beards; but that was probably a piece of folk-etymology on the part of the Latins, who got as near to a name of meaning as they could by altering the Teutonic tribal name. This was most likely *Lange Börde*—i.e. dwellers "along the banks" or borders of the Elbe—for a district near Magdeburg bears this very name to this day.

During the third and fourth centuries of our era the Lombards advanced to the banks of the Danube, where they became allies of Odoacer, king of Italy. Afterwards they almost exterminated the Heruli; and about the middle of the sixth century occupied part of Pannonia, under their king, Audoin. Here they came in contact with the Gepidae, a nation settled in Dacia, on the borders of the Eastern Empire, and, with the assistance of the Avari, totally defeated them.

In the year 568 ALBOIN, the son of Audoin, crossed the Julian Alps, and led the Lombards to the conquest of the plains of North Italy, which have ever since been called by the name of the conquerors. [See **LOMBARDY**.] Pavia became their capital. In 573 Alboin was murdered by his wife, and the nation became divided among a number of chiefs or dukes, under whom the Lombards penetrated south of the Apennines, and conquered Tuscany, Liguria, Umbria, and part of Campania. The Byzantine emperors retained the rest of Italy, with Sicily. After ten years of disorganization the Lombards chose for their king Antaris (586-592), at whose death his widow, Theodolinda, a Catholic, married Agilulfus, duke of Turin, who was then raised to the throne, became a Catholic (most of his countrymen being Arians), and made peace with Gregory the Great, bishop or pope of Rome. Theodolinda built the church and palace of Monza, where was deposited the iron crown (so called from a nail, said to be from the cross of our Saviour, fashioned into a long wire passing round in a groove inside the crown), which was for ages employed at the coronation of the kings of Lombardy. Agilulfus died in 615, and was succeeded by his son Adaloaldus, under the regency of Theodolinda.

Rothar, son-in-law of Agilulfus, was the first king who made a compilation of the unwritten laws and usages of the Lombards, and published them in a kind of barbarous Latin, under the name of the Edict, with his own preface and observations. This Edict is quite invaluable. It draws a marked distinction between the Lombards and the Roman or subject population, which continued to live under the Roman law, and were looked upon as a conquered and subject race; they had neither the same political nor civil rights as the conquerors, they had no voice in their assemblies, and they had no appeal against the caprice of their rulers.

Liutprand, who became king in 713, and reigned thirty-two years, was the most illustrious of the Lombard sovereigns. Astolphus, his successor, took Ravenna in 751, and put an end to the dominion of the exarchs, and hence of the emperors of the East, whose viceroys they were. Astolphus died in 756, and Desiderius, a Lombard duke, was elected his successor. Invited by the Pope, the Frank kings Pippin and Charles (the Great) came into Italy, and in 774 Charles defeated Desiderius, and carried him prisoner into France, where he became a monk. The kingdom of the Lombards ended with Desiderius, and the Lombard nation and its territories became subject to the Frankish king, who soon afterwards set up the Empire of the West (800). When the empire passed into German hands the kingdom of Italy passed with it; but the French never forgot their ancient possession, and from time to time sought to regain it down to the era of the first Napoleon. Wherefore, until our own day, Lombardy has been a field for contending nations, sown thick with memories of battles.

LOMBARDY and **LOMBARD CITIES**. The name of Lombardy, which is derived from that of the Lombards,

its former possessors, has been applied in its widest sense, though with no very definite limitation, to that tract of country which the Romans called by the name of Cisalpine Gaul, and which includes the principal part of the basin of the Po. It consists chiefly of an immense plain, 200 miles long and from 60 to 70 wide, from the Alps to the Apennines. See Po.

The overthrow of the kingdom of the Lombards by Charlemagne did not destroy the political existence of that people. They retained their laws and institutions, their property, and their numerous and powerful nobility; they continued a nation and a kingdom, subject, however, to the monarchy of the Franks. Although on the one hand the nobles fostered a feudal spirit, yet on the other the towns began to rebuild their walls, which had been razed by the barbarians. The towns had retained the ancient system of municipalities, and the citizens elected their own magistrates. After the deposition of Charles the Fat in 888, the crown of Italy was disputed for about seventy years among a succession of pretenders, Italians and Burgundians, until Otto I. of Saxony seized it with a firm hand, and was crowned at Rome by the Pope in 961. Otto and his successors resided chiefly in Germany; and the Lombard nobles and towns, though nominally dependent on the emperors, were in fact nearly independent.

Towards the middle of the eleventh century discord first began to break out in Milan and other cities between the various classes of the population. The lower nobility strove against those of higher rank, and the town-men lent their aid in such a way as to increase their own municipal influence. On one occasion, in 1041, the plebeians or burghers rose against the whole class of nobles, owing to some insult offered by one of them to a common citizen, and the result was a conflict of three years' duration. In 1059 began the long struggle at Milan and in the rest of Lombardy on account of the married clergy. After a contest of many years the Archbishop of Milan came under the power of the Pope, and the papal discipline was enforced of not admitting any married man to orders.

In the great contest of the investitures, the Lombard cities first aided one side and then the other; and it was during this long struggle that the cities really established their independence, acknowledging no longer the imperial *missi*, or vicars. The citizens then began to elect a certain number of magistrates, whom they styled consuls, who administered justice and commanded the militia. The rural nobles inscribed themselves among the citizens, and came to reside, at least for part of the year, in the city, in order that they might participate in the political rights. The towns governed themselves in all essential matters, but they owed allegiance to the emperor in certain particulars. No sooner, however, had the towns secured their municipal privileges than they began to fight among themselves; and for a long period Italy was disgraced by brutal contests, in which nearly the whole of the towns were engaged. After a long series of these municipal rivalries and battles, the Emperor Frederick, in 1162, succeeded in quelling a war in which Milan had been especially conspicuous, and in destroying that city. But he so misused his advantage as to raise up a general spirit of resistance against him. In April, 1167, a secret conference was held by deputies of the various cities; and it was resolved to form a league for the common protection, and to assist the Milanese in rebuilding their city. After a severe struggle the towns succeeded against the emperor, and brought about the peace of Constance, in 1183. By this treaty the cities were confirmed in their independent administration; they had the right of declaring war, of raising money, and other sovereign privileges, but acknowledged a sort of general obedience to the emperor in certain matters. No sooner, however, was this great contest ended than the towns recommenced their struggles with each other, and the contest between parties

in each town began again. The annals of Italy for the thirteenth century consist of little else than details of these encounters. It has been said that notwithstanding all these feuds the Italian free cities prospered. The real truth is that some of them flourished at the expense of the others. It is observed that a number of towns which are mentioned as being of importance in the eleventh century had disappeared in the thirteenth. We read of the glory and wealth of Milan and Florence, but we take no account of the depopulation and calamities of Lodi and of Pisa. Several causes contributed to maintain the wealth of the great Lombard cities during the middle ages—the extraordinary fertility of their territory, their manufactures, in which they were unrivalled in Europe, and the practice of their citizens of lending money at high interest throughout Europe, from whence the name of Lombard became synonymous with that of banker as well as usurer.

In the contests between the popes and Frederick II., in the middle of the thirteenth century, the Lombard cities were divided; and this division increased the anarchy which resulted from mutual jealousy and feuds. In 1260 Martino della Torre was chosen by the towns of Lodi and Novara as their "signore," or lord. The fashion spread: Cremona chose for its lord the Marquis Pelavicino; Verona chose Martino della Scala; Mantua, the Count San Bonifazio; Ferrara, the Marquis of Este, &c. Martino della Torre having died in 1263, his brother Philip succeeded him as lord of Milan, Lodi, and Novara, to which he added Como, Vercelli, and Bergamo, which towns elected him as their lord. Thus the foundation was laid of that consolidation of Lombardy into one state which in after-times was known by the name of the Duchy of Milan. The Archbishop of Milan, Otto Visconti, became "perpetual lord of Milan" in 1277; and his descendants, in the fourteenth century, ranked among the most powerful Italian princes. They extended their dominions not only over Lombardy proper, but south and west of it. Gian Galeazzo Visconti received in 1395, from the Emperor Wenceslas, the title of Duke of Milan and Count of Pavia. The charter of investiture included twenty-six towns and their territories, extending from the hill of Montferrat to the lagoons of Venice. Besides these he obtained also possession, by force or fraud, of Genoa, Lucca, Pisa, Siena, Perugia, Bologna, and other parts of Romagna. In the following century the duchy of Milan became circumscribed within narrower limits. The Venetians took the three provinces of Brescia, Bergamo, and Crema. The Swiss took possession of Bellinzona and other valleys north of the Lago Maggiore. The duchy of Milan likewise lost its conquests south of the Po. As it came into possession of Charles V. this duchy extended about 70 miles north to south, from the Alps to the Po, and 60 miles east to west. Its principal cities were Milan, Pavia, and Cremona. Mantua formed a separate duchy until the War of the Spanish Succession, when it was taken possession of by the house of Austria and annexed to the duchy of Milan. These two duchies constituted Lombardy proper. The duchy of Milan, during a century and a half that it remained under the Spanish branch of the house of Austria, declined greatly from its former prosperity, but with its transfer to the German branch of that house Lombardy began to recover its prosperity. By the peace of Campo Formio of 1797, which followed upon Bonaparte's great victories, and by the peace of Luneville, the states of Lombardy were detached from Austria. Milan and Mantua, or Lombardy proper, were first constituted as a Cisalpine republic; then as an Italian republic, with Bonaparte as president; and were afterwards formed into a kingdom, of which Napoleon made himself king in 1805; and subsequently they were incorporated with Venice, Modena, and other states into the Kingdom of Italy. In 1814 the Austrian and allied forces occupied the kingdom of Italy, and the Emperor Francis again took

possession of his former territories, which were confirmed to him by the congress of Vienna. The districts south of the Po were restored to their former sovereigns: Modena to its duke, and the Legations and Marches to the Pope. The Emperor Francis then constituted the territory of Milan, Mantua, and Venice into a kingdom, styled Lombardo-Venetia, under the imperial sway of Austria. But the war of Italian independence in 1859, resulting in the treaty of Villafranca, deprived Austria of her Lombardic provinces, which were then annexed, with the exception of Venetia, to the new kingdom of Italy. The old designation is no longer preserved, the country having been divided into the provinces of Bergamo, Brescia, Como, Cremona, Milan, Pavia, and Sondrio.

LOMBOK, an island of the Malay Archipelago, lying between 8° and 9° S. lat., and 115° and 116° E. lon. It has the island of Bali on the west, and that of Sumbawa on the east. The form of Lombok is nearly square, its mean length and breadth being respectively 53 and 45 miles; area, 1668 geographical square miles; the population is 250,000, mostly Mohammedans. The surface of the island is mountainous, and one of the loftiest peaks, Goemeng Pandjanie, is said to rise to the height of 12,000 feet above the level of the sea. The island is populous and well cultivated. The plains are entirely devoted to rice, the hill-sides producing coffee and maize. The chief port is Ampanam, on the western coast. It belongs to the Dutch.

LOMOND, LOCH. See DUMBARRON.

LONDON, the capital of the British Empire, and the largest, most populous, and most widely famed city of the whole world, lies upon both banks of the river Thames, and on the hills which inclose the river valley, about 51 miles from its mouth. The dome of St. Paul's Cathedral, which stands nearly in the centre of what is strictly called the "City," is situated in lat. 51° 30' 47.55" N., and lon. 0° 5' 18.2" W. The old city of London is situated wholly in Middlesex, but the town beyond the city limits extends into four counties, Essex and Middlesex on the north, and Kent and Surrey on the south bank of the river. It stands for the greater portion of its area on a bed of clay from 100 to 200 feet thick, known as the "London clay," in the centre of the great chalk basin extending from Berkshire to the east coast. This clay is covered in many places by sands and gravels belonging to the Drift period, marking the bed of a much larger river than the present Thames. On the south side of the river the town covers land which formerly consisted of marshes and small lagoons, while on the north side it occupies several ranges of small eminences which lie between the river and the northern heights of Hampstead, Hornsey, and Highgate.

For an adequate description of this mighty city many volumes equal in size to the present would be required, and from the necessary limits of space only the more important items of information can be included in this article. Readers who may desire to study the subject further will find a list of works on London at the end of the notice. For convenience of reference the information given is arranged under the following heads:—

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| <p>A. Government;
B. Extent and Divisions;
C. Population;
D. Commerce, Manufactures, and Trades;
E. Religious and Educational Resources;</p> | <p>F. Museums, Libraries, and Art Exhibitions;
G. Charitable Institutions;
H. Police Arrangements;
I. Public Buildings, &c.;
K. Postal Facilities, &c.;
L. Historical Notice.</p> |
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A. Government.—At the present time that vast congeries of independent districts which we call London is under the control of various administrative bodies—a circumstance which, until the last few years, interfered with every plan of general improvement and prevented the due execution of many important public works. The City, properly so called,

is one of the oldest municipalities in the United Kingdom. It contains 108 parishes and is divided into twenty-six wards, each governed by an alderman, who is elected for life, and, by virtue of his office, is a magistrate. Each ward also sends representatives to the Common Council, which consists of 206 members, and forms, with the lord mayor and aldermen, a species of civic parliament for the regulation of the police and the enforcement of social and sanitary laws. The lord mayor is chosen annually by the Livery from the aldermen, generally by seniority, and may be re-elected on the conclusion of his term of office. His residence is at the Mansion House, where, and at the Guildhall, are held the civic courts of justice. He is allowed an income of £10,000 a year to maintain the dignity of his office. The sheriffs of London are two in number, and are chosen annually from the Common Council. They are also sheriffs of Middlesex. The corporation that composed has a recorder, chamberlain, town-clerk, common sergeant, remembrancer, and other officers. The corporation of the city of London still retains certain exceptional privileges, and enjoys special revenues from a metage of grain and certain coal and wine duties which it is empowered to levy. A large portion of its income is derived from rents, and profits in the city markets; and these, with the rates levied upon the enormously valuable property comprised within the city and liberties, make up a total revenue of over £900,000 a year, not including the public and trust accounts, which are regulated by various Acts of Parliament.

Southwark was granted to the citizens by charter 1 Edward III., in order that they might have some control over the thieves who plundered the citizens and then passed into Southwark. It is governed by a high bailiff appointed by the citizens. It constitutes the ward of Bridge Without, and sends a representative to the court of aldermen.

The management of the streets, drains, and buildings of the metropolis was formerly in the hands of various local boards. To remedy the confusion, misgovernment, and other evils that resulted from such a conflict of authorities and interests an Act of Parliament was passed in 1855 (18 & 19 Vict. c. 11) constituting a body of fifty-five persons, to be elected by the ratepayers, with power of levying rates and effecting metropolitan improvements, under the title of the Metropolitan Board of Works. These elect one of their own number to act as chairman. They serve for a period of three years. This board has built for its own use a handsome set of offices on the site of Berkeley House, Spring Gardens, at a cost of £15,000. The city sewers are intrusted to the management of a commission appointed from the members of the Common Council under the Act 11 & 12 Vict. c. 163, and 14 & 15 Vict. c. 91. In 1866 the number of commissioners was increased to 100.

In addition to the City Corporation and the Metropolitan Board of Works there are within the metropolitan area thirty-eight vestries and district boards, which are intrusted with the management of local affairs; and the Metropolitan Asylums Board, the Burial Board, the Thames Conservancy Board, and the Lea Conservancy Board exercise authority over the matters indicated by their titles. The important School Board will be noticed further on. It is usual in connection with the government of London to enumerate the city companies, over eighty in number, relics of the old trading guilds or fraternities which in mediæval times were all-powerful within the city in their respective occupations, and with whose privileges the most despotic of our monarchs did not dare to interfere. The names of some of them refer to branches of trade that have long ceased to exist; they now possess but little influence, and are chiefly important as social and charitable corporations; only forty of them have halls.

Twelve of the wealthiest and most ancient are known as the Great Livery Companies. They are—the Mercers,

hall and chapel in Cheapside, between Ironmonger Lane and Old Jewry; the Grocers, hall in Princes Street, built 1798-1802; the Drapers, hall and gardens, Throgmorton Street; the Fishmongers, hall, Adelaide Place, London Bridge, built in 1831; the Goldsmiths, hall in Foster Lane, Cheapside, built by Hardwick in 1835; the Skinners, Dowgate Hill; the Merchant Taylors, hall in Threadneedle Street, built in 1667; the Haberdashers, hall in Gresham Street, rebuilt in 1835; the Salters, hall in St. Swithun's Lane, opened in 1827; the Ironmongers, hall in Fenchurch Street, built in 1748; the Vintners, hall in Upper Thames Street; and the Clothworkers, hall in Mincing Lane. Of the other companies the most important are—the Apothecaries, whose hall (1670) is in Water Lane, Blackfriars; and the Stationers, Stationers' Hall Court, Ludgate Hill. See also GUILDS and LIVERY COMPANIES.

B. Extent and Divisions.—It is very difficult to say what is the exact size of London, inasmuch as there is no definite boundary, and hence different estimates may be formed according to the way in which the surrounding suburbs are included or excluded. If we take, in addition to the old divisions of the Port, City, West End, and Borough, the different suburban villages which have been gradually absorbed, the metropolis, from Stratford and Blackwall on the east to Kew Bridge and Acton on the west, and from Clapham and Herne Hill on the south to Hornsey and Highgate on the north, is about 14 miles long by 8 miles wide. The parliamentary London comprises rather a less extent than this, but the district included in the jurisdiction of the Board of Works, which corresponds very closely with the London taken by the registrar-general for the census and tables of mortality, is substantially the same as we have indicated, and it comprises an area of about 75,500 acres, or nearly 122 square miles. This area is occupied by about 7,100 streets, their aggregate length being 2600 miles.

The district of the metropolitan police is much more extensive than that of the Metropolitan Board of Works; it extends over the whole of Middlesex (exclusive of the city of London) and the surrounding parishes in the counties of Surrey, Kent, Essex, and Hertford, of which any part is within 12 miles from Charing Cross, and those also of which any part is not more than 15 miles in a straight line from the same point. The police circle round Charing Cross contains all that can be reckoned as properly within the limits of London, and is too extensive for a natural boundary; for many of the parishes within the police district are entirely rural, and are quite sequestered from the great city, while at several points are large towns, of which Croydon is an example, chiefly bound to London by the daily intercourse of their populations. This district embraces an area of 690 square miles, with streets and roads measuring 6600 miles in length.

The principal divisions adopted for purposes of government and municipal administration are—(1) the City proper, which is bounded on the W. by the site of Temple Bar and Southampton Buildings, on the N. by Holborn, Smithfield, Barbican, and Finsbury Circus, on the E. by Bishopsgate Without, Petticoat Lane, Aldgate, and the Minories, and on the S. by the Thames; (2) Westminster, to the west of the City, bounded on the N. by Bayswater Road and Oxford Street, on the W. by Chelsea, Kensington, and Brompton, and on the S. by the Thames; (3) the parliamentary boroughs other than the City and Westminster. By the Reform Act of 1867 these were made up of Marylebone, Finsbury, Tower Hamlets, Hackney, Southwark, Lambeth, Greenwich, and Chelsea. In the Redistribution of Seats Act of 1885 an extensive subdivision of these districts was made. The City proper now returns two members, and there are single representatives for fifty-two other boroughs, making a total of fifty-four members; or fifty-nine if Hampstead, Battersea, Clapham, Wandsworth, and Lewisham are included.

For *poor-law* purposes London is divided into forty unions, in some cases single parishes, in others groups of parishes, while for the carrying out of the Metropolitan Buildings Act of 1885 the metropolis is divided into fifty-six districts, of which four are in the City, five in the city of Westminster, thirty in other parts of the metropolis north of the Thames, and seventeen south of the Thames. The annual ratable value of the house property of London was estimated in 1881 at nearly £28,000,000 sterling, and the number of buildings as 528,754. The latter included 1100 churches and places of worship, 7500 public houses, 1700 coffee-houses, and 500 hotels and inns.

C. Population.—No authentic estimate of the population of London can be traced much further back than two centuries. According to a return made in 1631, there was then a population *within* the walls of 71,039 persons, *without* the walls 40,579, and in the old borough of Southwark 18,660, making altogether 130,268 in the city and liberty (of Southwark), or 111,608 persons in the city exclusive of the liberty. In 1661 Grant reckoned that the 130,268 had become 179,000, and that the population within the "Bills of Mortality" was 460,000. At the close of the seventeenth century the population within the same limit was estimated as being about 550,000, and from about this period London superseded Paris as the largest city of Europe. From this time its progress fluctuated for over half a century, but after 1780 a rapid rate of increase commenced, which has continued up to the present time without diminution. The subjoined table gives the population of London for the last nine decennial censuses:—

Date of Census.	Population.	Increase between each Census.
1801 ...	958,863	...
1811 ...	1,138,815	179,952
1821 ...	1,378,947	240,132
1831 ...	1,654,994	276,047
1841 ...	1,948,369	293,375
1851 ...	2,362,236	413,867
1861 ...	2,803,989	441,753
1871 ...	3,254,260	450,271
1881 ...	3,814,571	560,311

In connection with the growth and movements of the population of London, we may quote the following from the preliminary report of the census commissioners:—"Looked at in any light the magnitude and growth of London are marvellous. . . . It grows as the power of England grows; it is the emporium of capital, and its people are in communication by birth and blood, by trade and intelligence, with all the affiliated cities in these islands. The railways have not only put the population of the kingdom in free communication with the metropolis, but have enabled large numbers of men of all ranks to settle around its borders. The central parts are converted into markets, exchanges, warehouses, stations, offices, which are thronged during the day but are deserted during the night by their occupants. A double force of displacement is at work; men are driven from London and Westminster by the high rents of the central houses, and are attracted outside by the charms of the surrounding country, with which the railways put them in easy communication. From 1801 to 1851 the population of the City remained almost stationary, the numbers being in 1801, 128,269, and in 1851, 127,869. The next return, however, showed a marked decrease, the number in 1861 being only 112,063, and this decrease has continued ever since at the same rapid rate, and will be seen from the returns already given. At the same time while the number of inhabitants has declined, the number of persons actually engaged, occupied, or employed daily in it, as well as the number of persons who, as clients, customers, and other frequenters, resort to it daily, has very largely increased." In 1881 the Corporation of London, dissatisfied with the return

for the City given in the census reports, ordered a day census to be taken, which showed that although the night population only amounted to 50,526, no less than 261,061 persons were actually resident or employed within the City on the day of investigation—an increase of 90,928 in excess of the ascertained results of the day census of 1866. The inquiry was further extended to the number of persons entering the City by the various inlets, sixty in all, including railway termini, steamboat piers and bridges, streets, lanes, courts, and alleys, and it was ascertained that during twenty-four hours 797,563 persons entered the City precincts on foot and in vehicles; about one-thirteenth (57,923) of the number passing in the eight hours of night, from 9 p.m. to 5 a.m., and the remainder during the sixteen hours of the day. The busiest hour of traffic was between 9 and 10 in the morning, when 101,111 passengers were recorded, although the preceding hour gave 93,205, these being the times

when the crowd of banking, mercantile, commercial, and legal persons pass in to their daily occupations. Thus more than one-fourth of the passengers streamed by in two hours out of the twenty-four. Of vehicles of all kinds there were 71,893; one-fourteenth (4984) passing during the eight hours of the night. The analysis gave 15,966 cabs, 6176 omnibuses, 29,396 heavy vans and waggons, and 20,355 light two-wheeled carts. In the case of both passengers and vehicles, no account was taken of those going out of the City; otherwise the number would probably have been doubled.

The following table, extracted from the census returns of 1881, gives some of the limits and jurisdictions as defined from time to time in Acts of Parliament and by the different authorities for certain specified purposes, and will serve to convey some idea of their number and general want of harmony:—

	Area in Statute Acres.	Inhabited Houses.		Persons.	
		1871.	1881.	1871.	1881.
City of London within the Municipal and Parliamentary Limits.	668	9,305	6,493	71,897	50,526
Metropolitan Parliamentary Boroughs (exclusive of the City of London).	45,173	372,821	426,491	2,915,974	3,401,824
Metropolitan Parliamentary Boroughs (including the City of London).	45,811	381,955	432,984	3,020,871	3,452,350
London within the Registrar-general's Tables of Mortality.	75,362	417,767	486,286	3,254,260	3,814,571
London under the Board of Works and School Board.	75,490	419,642	488,995	3,266,987	3,832,441
London within the Metropolitan and City Police Districts.	111,587	528,794	645,818	3,885,641	4,761,312

From the census returns of 1881 it appears that of the inhabitants of London about one-third consists of persons born outside its limits, and that it contains a very large foreign population. As the metropolis of the empire it is thither the representatives of other nations, of the colonies, and of Scotland and Ireland, resort; but it is chiefly the field in which the population of the several counties of England find scope for their talents and their industry. The number of the natives of the counties of England and Wales resident in London in 1881 was upwards of a million. Of other persons not natives of London, but resident there, we find that there are of—

Irish,	about 250,000
Scots,	" 120,000
Germans,	" 60,000
Asiatics, Africans, and Americans,	" 45,000
French,	" 30,000
Dutch,	" 15,000
Poles,	" 12,000
Italians,	" 7,500
Swiss,	" 5,000

while there are also about 40,000 Jews. It has been observed that there are in London more Jews than in Palestine, and more Roman Catholics than in Rome.

The enormously rapid increase in the size and population of London during the present century has given rise to many attempts to calculate its future progress, and to estimate some of the results which must follow from the collecting together of such large numbers of people. As, however, it would have been impossible at the commencement of the present century to foresee, from anything that was then known, the present position of the metropolis, we must regard most of the estimates which are formed as to the future as being very largely of a speculative character.

It has been computed that there is ample room upon the 75,500 acres of the metropolitan area to accommodate 6,000,000 people if they were properly distributed, so that whatever may be the increase of population the registration boundary would appear to be amply sufficient for a long time to come. It is also certain that the population cannot increase indefinitely in London or elsewhere; and the rate of increase depends on a variety of circumstances, none of which can be foreseen. Changes in the social and political condition of the people; indisposition to marriage, or a growing tendency to late marriages; augmentation or diminution of the duration of life; cessation or increase of migration; abundance or scarcity of the means of subsistence; all or any one of these causes might come into operation, and the effect on the increase of the population would soon be apparent. One important matter to bear in mind is, that the increased facilities which are afforded by the railways for conveying persons to country residences, or to towns within a short distance of London, have materially affected the metropolitan rate of increase already, and the effects will be more and more apparent in future years. Then, again, the increasing prosperity of some of the principal cities of the kingdom will render them formidable rivals in attracting the aspiring youth of the country. The growth of some of these cities is much more rapid than that of the metropolis; and there is this to be said, that whereas London has had a long spell of expansion, some of them have only just begun their career.

D. Commerce, Manufactures, and Trades.—London was a port of some consequence at the time of the Romans; it increased considerably in importance during the Saxon period, and during the mediæval period it was one of the most renowned marts of the western world. At the close of the sixteenth century it was undoubtedly the first

emporium of Europe, and this distinction it has never lost up to the present day.

Being essentially a mart the trade of London is marked by a large excess of imports over exports, and in this respect it offers a complete contrast to Liverpool, the next most important commercial city of England. In the matter of export Liverpool takes the lead, but the total shipping trade of the metropolis is unsurpassed in the world. The imports of cotton, wheat, flour, dye-stuffs, hemp, jute, palm oil, copper ore, lead, saltpetre, and molasses are greater at Liverpool than London; while in the articles flax, flax seed, and iron Hull takes the lead. In the articles of silk, butter, and eggs the imports of some of the south coast towns exceed those of London, but nearly the whole of these imports pass on by the railways to the metropolis; and Dover, Folkestone, Newhaven, and Southampton may be regarded as virtually ports of London. Nearly the whole of the French trade with England is concentrated in London, which also absorbs the greater part of the trade of the Baltic. London has also almost a monopoly of the trade with the East Indies and China, and it has commercial relations with every part of the civilized world. The value of the total imports in 1884 was £141,901,621, and of the exports £91,002,075. The customs revenue averages £10,000,000 per annum. The exact amount for 1884 was £10,009,603. The number of vessels registered and the entries and clearances were as follows, according to the most recent official returns:—

	Vessels.	Tons.
Registered in 1885.	2,816	1,219,207
Entries in 1884—Coastwise.	41,782	5,025,724
From foreign countries	10,868	6,769,767
and British possessions.		
Total.	52,650	11,795,491
Clearances in 1884—Coastwise.	13,394	1,757,565
To foreign countries and		
British possessions.	8,061	4,996,833
Total.	21,455	6,754,398

For the carrying on of this enormous trade immense docks and warehouses have been constructed, and the former are certainly the finest and most extensive in the world. Furthest down the river are the immense docks specially designed for ocean steamers at Tilbury, which were constructed by the East and West India Dock Company in 1885, and extend over 320 acres. Next come the Dagenham Docks, situated between Barking and Tilbury, on the Essex side of the Thames. The average width is 600 feet, and the length about a mile, thus affording nearly 2 miles of quay. The tidal basin is 450 feet long and 250 feet wide, the entrance gates 70 feet in width. The cost was £220,000. Below Blackwall, just beyond the Lea, are the Victoria Docks, which, with the extensions completed in 1880, are without a parallel. They are nearly 3 miles long, 450 feet wide, and cover 175 acres. There are twenty iron sheds, each occupying about an acre of space, very large dry docks, and 7 miles of quays. The cost was over £2,000,000, and would have been considerably more, but for the general use of concrete instead of stone, and the cutting through of a large marsh which, in the first instance, was 7 feet below high water. Next are the East India Docks, commenced in 1863 and finished in 1896. These consist of two docks and a basin, to which was added in 1870 a new south dock of 33 acres. The import dock has an area

of 19 acres, the export dock of 10 acres, and the basin of 3—making a total surface of 32 acres. The cast-iron wharf, 750 feet long, is said to weigh 900 tons. The West India Docks cover 95 acres, and lie between Limehouse and Blackwall, on the left bank of the Thames. The first stone was laid by the great commoner William Pitt in 1800, and the docks opened for business two years later. The export dock is about 2600 feet in length by about 400 feet in breadth; the import dock is of the same length, and 500 feet in width, and is bounded on the north side by eleven extensive stacks of warehouses. Between the import and export docks are extensive sheds and vaults for rum; and an eastern and western wood quay and sheds, containing an immense stock of mahogany, cedar, rosewood, ebony, dye-woods, &c. South of the export dock, and immediately adjoining, lies the South Dock, formerly called the City Canal. This dock is upwards of 3700 feet long, and has recently been enlarged to a width of upwards of 400 feet. The basin connecting the docks with the river at Blackwall is nearly 6 acres in extent, while that at the Limehouse end is about 2 acres. The new Millwall Docks, on the Isle of Dogs, opposite Greenwich, have a frontage of 7700 feet, an area of 200 acres, and immense floating and graving docks and basins. Near the Tower are St. Katherine's Docks, of which the first stone was laid in 1827. The architect was Mr. Hardwick, and the celebrated John Telford the engineer of the structure, of which Sir John Hall was the chief promoter. The total cost was £1,700,000. The area of the docks is about 24 acres, of which $11\frac{1}{2}$ are in water; and the lock is sunk so deep that ships of 700 tons burden may enter at any time of the tide. Of the London docks, the first and largest (John Rennie, engineer) was opened in 1805, having occupied three years in construction. The New Tea Warehouses, capacious enough to receive 120,000 chests, were erected in 1844-45, and comprise an area of 90 acres. There are twenty warehouses, eighteen sheds, seventeen vaults, and six quays, with three entrances from the Thames. The entire structure cost £1,000,000. The Commercial Docks consist of five ample and commodious docks on the south side of the river, with an entrance from the Thames. There are, besides, on the north side of the river twenty-five dry or graving docks, including a patent slip, and fifteen of the same kind on the opposite side.

The docks on the south side of the river have a total land and water area of 330 acres, while those on the north side, completed or under construction, comprise an extent of over 2200 acres. The warehouses attached to these docks form small towns of themselves above ground, while below ground there are enormous vaults lined with brick and masonry for the storage of spirits, wine, oil, &c. Nothing will convey so clear an idea of the vast activity and stupendous wealth of London as a visit to these warehouses, filled to overflowing with interminable stores of tea, coffee, sugar, silk, tobacco, and other foreign and colonial products; to the enormous vaults, with their apparently inexhaustible quantities of wine; and to these extensive quays and landing stages, cumbered with huge stacks of hides, heaps of bales, and long rows of casks of every conceivable description.

In addition to its commerce, the unique position of London, and its intercourse with all parts of the earth, have assisted to make it financially the clearing-house for international trade generally, and it is certainly the financial centre of the world. There are over 150 private and joint-stock banks which have offices in London, and in the article under BANK we have given some statistics of the amount of business transacted by the chief of them. The business centre of London is the Royal Exchange, and besides the important Stock Exchange, just adjacent, there is also a Corn Exchange in Mark Lane, Sale Rooms in Mincing Lane for Colonial produce, a Wool Exchange in

Moorgate Street, a Coal Exchange adjoining the Custom-house, and the Auction Mart in Tokenhouse Yard, where landed property is chiefly dealt in.

London cannot be termed a manufacturing city in the ordinary sense of the term, and the largest industry of this kind is that of brewing, which is carried on by over 100 brewers. The largest portion of the beer made is consumed on the spot, but nearly 250,000 barrels are exported annually. There are large engineering works at Lambeth and Millwall, potteries and glass-works at Lambeth and Southwark, tanneries at Bermondsey, sugar refineries in Whitechapel, chemical works upon the Lea, and paper-works on the Wandle. Cabinetmaking is carried on largely in the neighbourhood of Curtain Road, Shoreditch, and an immense wholesale shoe trade is centred in the neighbourhood of Shoreditch and the Hackney Road. Lucifer-match making is chiefly confined to the east end of London. Clock and watch makers, who are numerous, reside principally in Clerkenwell. The finest cutlery and hardware are produced, and the manufacture of metals of all kinds is also carried on to a great extent. Coach-building is an important business, and the carriages of London are not only the handsomest, but the best built and most durable of any in the empire. Great numbers are made for exportation. Many hands are employed in type-founding; and the manufacture of musical instruments, particularly pianofortes and harmoniums, is conducted on the largest scale. Owing to the extent to which the division of labour is carried, the tradesmen and artisans of London have attained to the greatest proficiency; and it is generally admitted that the jewellers, silversmiths, engravers, cabinetmakers, printers, tailors, shoemakers, and bookbinders of the metropolis are quite unrivalled in their respective crafts.

It is impossible to form even the roughest estimate of the extent of the internal trade of London or of the various occupations of its inhabitants, but a few statistics may not be without interest. In the matter of food supply there are annually consumed about 2,000,000 quarters of wheat, 400,000 oxen, 1,500,000 sheep, 130,000 calves, 250,000 swine, 8,000,000 head of poultry and game, 400,000,000 lbs. of fish, 500,000,000 oysters, 1,200,000 lobsters, and 3,000,000 salmon. The water supply of the metropolis is a monopoly enjoyed by nine great water companies, who supply about 150,000,000 gallons daily. Much of the supply is drawn from sadly polluted sources, and though it is carefully filtered its quality sometimes leaves much to be desired. Like most monopolists also the companies have systematically disregarded public interests in their desire for private aggrandisement, and their rapacity has long been the source of much just complaint on the part of the inhabitants of the metropolis. A proposal was made in 1880 to purchase the rights of the companies, whose capital was then a little over £12,000,000, for £34,160,000, but the House of Commons declined to sanction the proposal. Of coal about 4,000,000 tons are brought into London by the river, and the railway companies supply about as much more.

E. Religious and Educational Resources.—London became the seat of a diocese about 600–610, when Ethelbert, king of Kent, founded the East Minster on the site of St. Paul's. The diocese comprises London and Middlesex, with small portions of Essex, Kent, and Surrey immediately adjoining, in the province of Canterbury. The benefices number about 350. The bishop has an income of £10,000, with a seat at London House, St. James' Square, a palace at Fulham, on the Middlesex bank of the Thames, and the patronage of about 109 livings. The dean's income is £2000. The dean and chapter hold the patronage of forty-six livings.

There are about 800 churches of the Church of England in London or its immediate vicinity, of which 100 are parish churches in the City, fifty parish churches in the

metropolitan district beyond, and 250 ecclesiastical parish or district churches or chapels, some connected with asylums, missions, &c. Of the nonconformist churches, which amount to about 600 in all, 240 are Independent, 150 Methodist, 130 Baptist, and fifty Roman Catholic. Large as are these numbers it has been shown that if all the persons in London who are not physically disqualified, or kept away for any legitimate reason, were to attend public worship at the same time, about one-half would have to be shut out for want of room. This has occasionally been made the basis for appeals for increasing the amount of accommodation, but while there are doubtless districts where this might be done to advantage, the existing accommodation unhappily is by no means well used in many parts of the metropolis. In a very large number of the parish churches of the City the Sunday congregations may often be counted on the fingers, and they are seldom opened at any other time. A few of the fashionable or popular places of worship are always crowded, and visitors have to attend early to secure a seat; but taking the metropolis all round it is estimated that at least one-third of the sittings are unoccupied at the most numerously attended services. As might be expected, most of the religious denominations of Protestantism have meeting-places in London, and nearly every nation of Europe is represented by a national place of worship. In addition to the regular places of worship, to most of which are attached charitable and educational societies, there are also a large number of religious societies which make London their headquarters, and many of them devote their energies specially to the metropolis. Among the most widely famed of these religious societies are the British and Foreign Bible Society, the London Missionary Society, and the Society for the Promotion of Christian Knowledge.

Whatever may be thought concerning the provision made for the public devotion of the inhabitants of London, there can be no question as to the wealth of its educational appliances. The two chief colleges in London are connected with the London University. [See LONDON, UNIVERSITY OF.] University College, in Gower Street, founded in 1828 chiefly through the exertions of Lord Brougham, was originally called London University, but since 1837 the more limited designation has been given to it. It was designed to afford, on the propaedeutic system, a good middle-class education at a moderate expense, without limitation as to religious tests. The whole range of university tuition is given except divinity, with the addition of much fuller instruction in science and modern languages than was before usual in colleges. The college buildings contain numerous lecture-rooms, a laboratory, and a museum. There is also included a school for boys under sixteen years of age. The number of professors is about thirty, and that of students about 1600, the fees from the latter amounting to about £30,000 a year. Opposite the college, and connected with it as a clinical establishment, stands the University College Hospital, which is attended by the medical professors of the college. King's College, which occupies the large pile of buildings that forms the east wing of Somerset House, was founded the same year as University College, and it provides similar instruction to the latter, but with the addition of divinity, and in connection with the Church of England. Gordon College, or University Hall, in Gordon Square, is an establishment mainly supported by Unitarians. New College, at St. John's Wood, for Congregationalists or Independents; the Baptist College, in the Regent's Park; the Wesleyan College, in the Horseferry Road; Hackney College; and several others of less importance—are establishments maintained by various bodies of dissenters, some for educating ministers for the pulpit, some for training schoolmasters and school-mistresses. Of the buildings so occupied the handsomest is New College. This was established a few years ago as

a substitute for Highbury, Homerton, and Coward Colleges, all belonging to the Congregationalists. Gresham College is not a college in the modern sense of the term; it is only a lecture-room. Sir Thomas Gresham left an endowment for an annual series of lectures, and residences and stipends for the lecturers. The charity was greatly misused during the seventeenth and eighteenth centuries. Public attention having been called to the subject, a new lecture-hall was built a few years ago at the corner of Basinghall and Gresham Streets out of the accumulated fund, and lectures are delivered here at certain periods of each year. The subjects are divinity, physic, astronomy, geometry, law, rhetoric, and music. The lectures take place in the evening in English; they are freely open to the public, and the auditors to some of them are fairly numerous. Among the training colleges for school masters and mistresses are the National Society's at Chelsea, the British and Foreign at Stockwell and in the Borough Road, and the Home and Colonial in Gray's Inn Road. The College of Preceptors, in Queen Square, resembles the London University in this—that it confers a diploma, but does not teach, further than by providing occasional courses of lectures and opportunities for discussion. Many so-called colleges are either proprietary or private schools.

The chief of the public schools in London is Westminster School. It was founded in 1560, and lies south-west of Westminster Abbey, but very near it. Some of our greatest statesmen and scholars have been educated here. St. Paul's School, situated on the eastern side of St. Paul's Churchyard, was founded in 1512 by Dean Colet, for the education of "poor men's children." Like many others of the older schools, the benefits are not conferred so fully as they ought to be on the class designated. The presentations are wholly in the hands of the Mercers' Company. The now existing school-house, the third on the same site, was built in 1823. The Charter-house School, formerly near Aldersgate Street, is part of a charity established by Thomas Sutton in 1611. There is an hospital or almshouse for about eighty "poor brethren," men who have seen better days; and there is a school for the free education of forty "poor boys," with many more whose parents pay for their schooling. The school was removed to Godalming, Surrey, in 1871, the former building having been purchased for the Merchant Taylors' School. Christ's Hospital, or the Blue-coat School, as it is commonly called from the colour of the boys' dress, is situated within an inclosure on the north side of Newgate Street, and is one of the most splendid among the charitable foundations of London. See CHRIST'S HOSPITAL.

The Merchant Taylors' School was founded in 1561 by the Merchant Taylors' Company. The school was removed in 1875 to the buildings of the Charter-house. About 500 boys are educated, wholly on the presentation of members of the company; and there are numerous fellowships at St. John's College, Oxford, open to the scholars. Mercers' Free Grammar School, in College Hill, is a small establishment of a similar kind. The City of London School, in an exceedingly handsome building on the Thames Embankment, was originally founded in Milk Street in 1835, and forms a useful medium between the old grammar-schools and the modern private schools; it possesses several exhibitions for the more successful senior scholars. The Middle Class Education Corporation was established in 1866, to provide a liberal education for the sons of clerks in city offices, and other persons of the same class, at the charge of one guinea a quarter. Upwards of 1000 boys are now training at the Central School at Cowper Street, City Road, and several similar schools have been established.

The schools established under the auspices of the National Society, called National Schools, are very numerous, but need not be noticed here. The British and Foreign School Society, in the Borough Road, trains up

teachers without reference to religious tests; whereas the National Society is in connection with the Church of England. Many very superior schools for girls have been established in the metropolis within the last few years.

Under the provisions of the Education Act of 1870 a School Board was elected for London, consisting of forty-eight representatives from the various districts. Numerous large and commodious school buildings have been erected under their auspices, and by the end of 1881 the Board had supplied places for 236,000 children, and was making provision for 100,000 more. This, with the accommodation provided by the voluntary schools, gives a total number of places for over 600,000 children. During the past few years much dissatisfaction has been expressed with the work of the School Board, on account of its alleged extravagance, cumbrous and offensive system of officialism, and the disregard displayed by it for the interests of existing schools.

F. Museums, Libraries, and Art Exhibitions.—Among the museums open to the public, or readily accessible, are the following:—The British Museum, which has already been described [see BRITISH MUSEUM], the Museum of Natural History, the South Kensington Museum, the Museum of Patent Inventions, and the East London Museum in Bethnal Green.

The South Kensington Museum at Brompton is situated about a mile distant from Hyde Park Corner, near the site of the International Exhibition of 1862. The ground was bought at a cost of £60,000. The collection consists of—(1) objects of ornamental art; (2) British pictures, sculpture, and engravings; (3) architectural models, casts, &c.; (4) school furniture, books, diagrams, models, and educational appliances; (5) building materials, stone, bricks, tiles, glass, &c.; (6) nutritive substances; (7) animal products employed in the arts, leather, furs, feathers, wools, &c.; (8) models of patented inventions, machines, &c.; (9) reproductions, by means of photography and casting, of antique sculpture and paintings.

All the paintings exhibited at the South Kensington Museum are in galleries well lighted from above, and are thus shown at night as well as by day. The collection of British pictures was commenced by Mr. Sheepshanks, and bequeathed by him to the museum. The gift was valued at £53,000.

Near the South Kensington Museum is the Royal Albert Hall of Arts and Sciences, opened by her Majesty in 1871. The building is oval in form, and can conveniently seat 8000 persons, including an orchestra of 1000. It was built chiefly with the view of perpetuating the success of the great Exhibition of 1851, by providing a common centre of union for the various departments of science and art. In the immediate neighbourhood also are to be found the India Museum, which contains a magnificent collection of every variety of Indian art and manufacture, the National Portrait Gallery, and the National Natural History Museum, which is one of the best in the world.

There are numerous and special collections attached to University and King's Colleges, and (among others) the City Museum, Guildhall; Royal Institution, Albemarle Street; India Office; Soane Museum, Lincoln's Inn Fields; Society of Arts, Adelphi; Trinity House, Tower Hill; Linnæan Society, Piccadilly; Royal Botanic Society, Regent's Park; Museum of Practical Geology, Jermyn Street; Architectural Museum, South Kensington; Royal United Service, Whitehall Yard; Royal College of Surgeons, Guy's Hospital, Borough; St. Bartholomew's, King's College, and other hospitals, and the Veterinary College, Camden Town, for anatomical preparations; Bank of England; Artillery Company, Armourer's Hall, the Tower, and Woolwich Repository and Arsenal, for arms and armour.

In the British Museum Library, London rejoices in the possession of the finest collections of books in the world,

with the possibly single exception of the Bibliothèque Nationale of Paris; but beyond this it is badly off as regards public libraries. Almost the only other large free library that is readily accessible is that of the corporation of the city of London, at the Guildhall, which includes over 80,000 books and about 300 MSS. Some small public libraries have within the last few years been established in several of the districts of London. Among the libraries of a special character, mention must be made of the valuable archiepiscopal library at Lambeth; Sion College Library, the most valuable theological library in London; Dr. Williams' Library, which contains a large collection of books of Puritan theology, many valuable MSS., and some fine portraits of Baxter and other divines; the library of the Oratory at South Kensington, chiefly Roman Catholic theology; the law libraries of Lincoln's Inn, Gray's Inn, the Temple, and the Incorporated Law Society; the scientific and technical library of the Patent Office; the library attached to the Museum of Practical Geology; the art library at South Kensington, and the archaeological library of the Society of Antiquaries. Of the subscription and circulating libraries the largest are Mudie's, the London Library, and that of the London Institution. In addition to these, most of the scientific and learned societies in which London is peculiarly wealthy have special libraries of their own.

Like most of the European capitals, London is rich in the possession of many important works of art. The National Gallery, although only formed in 1824 by the purchase of the Angerstein collection of thirty-eight pictures for £57,000, has been so rapidly and greatly extended by means of purchases, legacies, and donations, that it now comprises over 1000 pictures, which are exhibited in eighteen rooms. It possesses some noble examples of the older Italian masters and some of the finest pictures of the English school, and taken altogether is now considered to be one of the best collections in the world. The original building in Trafalgar Square was designed by Wilkins, and erected in 1822-38 at a cost of £26,000. It was considerably enlarged and altered in 1860, and a further extensive addition was made in 1876, by which the accommodation was doubled. It contains, among other pictures, the *Ansdei Madonna* of Raffaele, purchased from the Duke of Marlborough in 1885 for £70,000—probably the largest sum ever given for a single picture. The National Portrait Gallery, the nucleus of which was formed in 1858, contains a very valuable series of original portraits and busts of celebrated Englishmen. It is now located at South Kensington. The South Kensington Museum also contains, among its other treasures, a very valuable and interesting National Gallery of British Art, which includes a fine collection of water-colour paintings. The world-famed cartoons of Raffaele, formerly preserved in Hampton Court Palace, are now exhibited in a separate gallery at the museum. The Royal Academy of Arts, the oldest and most influential institution in London connected with painting and sculpture, is now established in Burlington Gardens, occupying a fine building in the Italian Renaissance style, erected from the designs of Smirke in 1868-69. The annual exhibition of paintings and sculptures by modern British artists which takes place here from May to August attracts immense numbers of visitors, and forms the great art event of the year. Winter exhibitions of the works of old masters are also annually held, and a collection of ancient works of art and diploma pictures presented by Royal Academicians on their election is open all the year round. The Grosvenor Gallery in New Bond Street, erected by Sir Coutts Lindsay, is used both for summer and winter exhibitions, and there are numerous smaller exhibitions held in different parts of the West End during winter and spring, and a few that are kept always open.

G. *Charitable Institutions.*—In no respect is the metro-

polis more worthily distinguished than in the number and splendour of its charitable institutions, which minister to every want of humanity, and whose aggregate income exceeds the revenue of several important European states. In the City alone the endowed charities of the corporation possess an annual income of over £30,000, while those of the livery companies have an aggregate income of £200,000. There are in London upwards of 1000 distinct charitable associations and separate funds, and the total annual income derived from voluntary subscriptions, donations, and bequests considerably exceeds £4,000,000. Among the charities are to be found hospitals, dispensaries, and asylums; Bible, tract, missionary, and district-visiting societies; provident homes, orphanages, and almshouses. Among the hospitals are especially noticeable the Chelsea Hospital, for old and disabled soldiers, founded in the reign of Charles II.—the buildings, which face the river Thames, were the work of Sir Christopher Wren; the Royal Military Asylum, to the north of the hospital, where the children of soldiers are supported and educated; the Foundling Hospital, Guildford Street, founded in 1739 by Thomas Coram, for the maintenance of illegitimate children; St. Bartholomew's Hospital, Smithfield, founded by Henry VIII., now containing 676 beds, with an income of about £40,000 yearly; St. Thomas' Hospital, opposite the Houses of Parliament; Guy's Hospital, Southwark, so named from its founder, built in 1722-24; University College Hospital, founded in 1833; Westminster Hospital; Charing Cross Hospital, founded in 1818; St. George's, Great Northern, King's College, the London, St. Mary's, Middlesex, and Royal Free Hospitals; Greenwich Hospital, for sick and diseased seamen of all nations; Bethlehem and St. Luke's, for the reception of lunatics; the Cancer, Consumption, and Fever Hospitals, and numerous other institutions for the treatment of special diseases. Altogether there are eleven great hospitals, with medical schools attached, having an average of 396 beds each, and sixty-four smaller hospitals, without schools, with an average of seventy-three beds each. The work done by the two classes of hospitals is about the same; the former relieve upwards of 70,000 in and 600,000 out patients, and the latter upwards of 40,000 in and 70,000 out patients during the year. Some of the large ones are richly endowed, but most of the small ones depend entirely on voluntary contributions. The local and parochial charities are organized on an equally splendid scale, and their revenues are chiefly devoted to the education and apprenticeship of children, endowment and repair of churches, and support of almshouses. There are about 100 almshouses, and 200 infirmaries, dispensaries, and asylums.

In June, 1873 (under the auspices of the Lord Mayor and the principal clergy of the metropolis), a fund was established, called "The Hospital Sunday Fund," for the purpose of collecting money for the principal hospitals and dispensaries in London. In 1874 an "Hospital Saturday" was inaugurated, with the view of enabling working men to contribute.

In the presence of these statistics it may not be unreasonably inquired, How is it that so much desperate poverty exists in London, and that the "bitter cry" of distress is never silent there? The answer to this question is not easy to find, but there are one or two points which are established beyond controversy—(1) that a large number of the endowed charities of London are sadly mismanaged, and that large sums, which represent the increased income derived from ancient charitable bequests, are systematically misappropriated; (2) that there is a great need for a consistent system in the management of the different charitable societies, in order that they may not overlap each other in some places and leave others neglected; and (3) that many of the minor industries of London which are followed by the poorest class are shame-

fully underpaid, and in consequence large numbers of persons are always living on the verge either of pauperism or starvation.

The giving of outdoor relief, which formerly prevailed to a great extent in connection with the different parishes, has been much checked of late years, and in consequence the number of paupers has greatly declined; and though the application of the workhouse test has undoubtedly acted with harshness in some cases, its operation has contributed very considerably to increase the independence of the poorer classes.

H. Police Arrangements.—The London police district is divided into two police jurisdictions—that of the Metropolitan police, with an area of 440,919 acres, and that of the City police, with an area of 668 acres. There are two police courts within the City district, viz. Guildhall and Mansion House, and thirteen within the Metropolitan district. The headquarters of the Metropolitan police are at Scotland Yard. In 1884 the City police force included one superintendent, one chief inspector, one inspector of the detective department, twelve inspectors of divisions, fourteen station sergeants, twelve detective sergeants, sixty-eight sergeants, and 785 constables. In the Metropolitan district the authorized strength in 1884 was one chief superintendent, two district superintendents, twenty-four superintendents, 639 inspectors, 1071 sergeants, and 11,226 constables, or a total force of 12,963 men. The Metropolitan district is divided into twenty-two divisions, including the Thames—a water division—each governed by a superintendent. Each division is divided into subdivisions, and these again into sections, which are again subdivided into beats. The policemen have charge of the beats, the sergeants have charge of the sections, the inspectors of the subdivisions, and the superintendents of the whole division. Every divisional station is in direct communication by telegraph with the great central office at Scotland Yard, which is also connected in the same manner with all the chief fire stations, so that literally in one minute every division and fire station in the metropolis could be alarmed, and their reserves moved on any given point. The number of men employed on police duty proper—that is, in watching and patrolling the streets—is in the proportion of two-thirds by night and one-third by day. There are more policemen on duty between seven and ten in the evening than at any other time of the day, long experience having proved that it is between these hours that most thefts and depredations are attempted. Each man has eight hours' night patrolling for eight months of the year, and ten hours' day patrolling for four months of the year.

There are usually about 1400 known thieves resident in London, and there are at least 1000 more persons who are recognized by the police as belonging to the criminal classes. In round numbers about 80,000 arrests are annually made within the police districts; but more than one-third of these are apprehensions for drunkenness. In addition to their duties in repressing and detecting crime, the work of the force comprises the regulation of the traffic of crowded thoroughfares, the guarding of the Houses of Parliament and other buildings, and the carrying out of the provisions of the Common Lodging Houses Acts, the Smoke Nuisance Acts, and the Prevention of Crimes Act. Many are also placed at the service of private individuals (who pay their charge), and large numbers are employed in connection with the various offices and works of the government.

The prisons of London comprise Newgate Prison and Holloway Prison, which are in the hands of the Court of Aldermen of the City; the Clerkenwell House of Detention; and the two houses of correction for Middlesex, viz. Coldbath Fields, for males, and Westminster, for females; the Wandsworth House of Correction for Surrey; and the convict prisons of Brixton, Fulham, Millbank, Pentonville, Woking, and Wormwood Scrubs.

I. Public Buildings and Objects of Interest.—In the very heart of the City of London, and conspicuously situated on a slight eminence, stands the most prominent building of the metropolis—St. Paul's Cathedral. Its lofty dome, which can be seen for many miles round, stands at the head of Ludgate Hill, and the cathedral occupies the site of a church founded in 610 by Ethelbert. It has even been stated, and not without evidence, that a Christian church was erected on this ground in the time of the Romans, which was demolished at the period of the Saxon invasion. The building erected by Ethelbert was burned in 961, and another was erected in its place in 962. This was destroyed by fire in 1087; but the cathedral was again rebuilt, and with many alterations it stood until 1666, when it was burned down in the Great Fire of London. An entirely new edifice was then erected under the auspices of Sir Christopher Wren, and was first opened for divine worship in 1697.

The cathedral is built in the form of a Latin cross, 514 feet in length by 286 in breadth. Outwardly the walls exhibit a double range of windows; there are three porticoes at as many entrances on the north, west, and south, of which that on the west is the principal, facing towards Fleet Street, with twelve lofty Corinthian pillars below, and a second order carrying the pediment above. The angles are crowned with handsome bell-towers, the size of ordinary church steeples, and 222 feet high. It is strange that, in relation to the best known building in London, great concordance exists in the accounts of the cathedral concerning the total height. Wren's son, in the *Parentalia*, simply states that the lantern is 330 feet from the ground; Maitland gives the total height at 340 feet; many authorities name 360 feet; while several handbooks and guides, following the pamphlet sold in the cathedral, raise it to 404 feet. This last statement agrees with the well-known tradition that St. Paul's is twice as high as the Monument. A careful examination of the vertical section, however, shows that the height is about 356 feet above the marble pavement of the cathedral, 375 above the level of the crypt, and 370 above the pavement of the churchyard. It will thus be sufficiently near the truth to say that St. Paul's is 365 feet high.

There are two domes, an outer and an inner, having a brick cone between them. The inner dome was decorated with paintings, relating to the life of St. Paul, by Sir James Thornhill. These paintings, not specially remarkable, except for their vast size, have given place to splendid mosaics, the first of which was fixed in 1884. The organ has been divided and a half placed on each side of the beautiful choir, which now lies open to view from the nave.

The various parts of the building comprise—the whispering gallery, which renders every whisper audible from side to side; the library, containing chiefly ecclesiastical works for the use of the chapter; and the two golden galleries at the top of the inner and outer domes. The ball and cross, reached by more than 600 steps, are at the summit of the building; the ball, about 6 feet in diameter, being reached with great difficulty. The clockwork and great bell excite much attention from visitors. The pendulum measures 14 feet in length, while the mass at its extremity is 1 cwt. The great bell of St. Paul's, which was successfully cast and hung in 1882, is the heaviest bell in England, weighing as it does 16 tons 15 cwt. This bell, "Great Paul," is used for special occasions only, the bell used to strike the hours being much smaller, though even this weighs 5 tons 4 cwt. See *BELL*.

Much has recently been done to improve and embellish the interior of the cathedral, and to complete it according to the magnificent design of its great architect, and the work is still proceeding, though its vast extent renders the task very costly.

Westminster Abbey is situated opposite the Houses of Parliament. In early times its site was a small insular

tract surrounded by the waters of the Thames, and called Thorney Island. Here a monastic institution was founded, which became a ruin during the reign of the Confessor, who raised an abbey among the shattered remains. The ground-plan, as usual, bore the form of a cross. Various privileges and endowments were granted to it, and the edifice assumed a great degree of architectural grandeur. It soon became a place for the coronation of our monarchs, and William the Conqueror was crowned here in 1066. The abbey was enlarged by Henry III. and Edward I., and continued nearly in the state they left it until Henry VII. added a chapel to the original structure, in the Perpendicular style, upon which the highest skill of the architect and sculptor was lavished. It was universally regarded as one of the most splendid edifices of the age, and was specially reserved as the place of sepulture of our English sovereigns.

During the reign of Henry VIII. the abbey was considerably defaced; but on the surrender of its revenues the king raised Westminster to the dignity of a city, and its abbey was constituted a cathedral. In 1555, however, it was united to the see of London. In the reign of William and Mary it was thoroughly repaired, and the towers added to the western entrance, under the direction of Sir Christopher Wren. The present length of the abbey is 416 feet; breadth of transept, 203 feet; at the nave, 102 feet; height of the west towers, 225 feet. The exterior measurement, including Henry VII.'s Chapel, is 530 feet.

The interior is of great magnificence, and displays grand masses of marble columns separating the nave from the side aisles. A screen, on which the organ rests, divides the nave from the choir; while the walls are covered with a profusion of sepulchral monuments. The northern window is richly ornamented with stained glass. At the eastern end of the choir stands the chapel of Edward the Confessor, containing the shrine of St. Edward. Here also is the coronation chair of the Scottish kings, brought from Scone by Edward I. in 1297; and the chapel of Henry VII., in which lie the ashes of Queens Mary and Elizabeth. The magnificent tomb of Henry VII. and his queen is placed in the body of this chapel, in a curious chantry of cast brass, admirably executed, and interspersed with effigies, armorial bearings, and devices relating to the union of the Red and White Roses.

Statues are numerous in the abbey, and are chiefly contained in side chapels, of which there are several—viz., St. Benedict's, St. Edmund's, St. Nicholas', St. Paul's, St. Erasmus', John the Baptist's, and Bishop Islip's, besides those of Henry VII. and Edward the Confessor. The choir, transept, and nave also contain many specimens of sculpture, from the chisels of Flaxman, Chantrey, Roubiliac, Bacon, Westmacott, Gibson, Behnes, and others. Poet's Corner is the famous receptacle of the busts of English worthies. The cloisters and the chapter-house contain some curious old effigies. Westminster Abbey is a collegiate church, with a dean and chapter, who possess considerable authority over the adjoining district, and a revenue of about £30,000 per annum.

The Temple Church belongs to the two Temples—the Inner and Middle. The members of the former occupy the southern half, and those of the latter the northern. The entrance doorway is of great interest. The Round Church, 58 feet in diameter, affords one of the early examples of pointed arches in this island. The clerestory is pierced by six Romanesque windows, while the vaulting is supported by six clustered pillars of Purbeck marble, with boldly sculptured capitals. The Rectangular Church, or Choir, is in the Early English style. It is 82 feet by 58 feet, with a height of 60 feet, the roof being painted with arabesques, and triple lancet-headed windows admitting light. The great east window is ornamented with modern stained glass; and on the wall, beneath the windows, the hymn of St. Ambrose is inscribed. The organ was built by one

Schmydt, after a competition with another builder, which Judge Jeffreys was called upon to decide. The preacher at this church is designated the Master of the Temple; his house is north-east of the choir, and has a small garden attached to it.

Westminster Palace, which occupies a site close to the river and to the beautiful new Westminster Bridge, was constructed in consequence of the burning of the old Houses of Parliament in 1834. It is the finest modern Gothic structure in the world—at least for civil purposes—and covers an area of nearly eight acres. Among the multitudinous objects of interest in this gorgeous building, which has cost more than £2,000,000 sterling, the following may briefly be mentioned:—The House of Peers, 97 feet long, 45 wide, and 45 high. It is profusely gilt and painted, and the windows are ornamented with deep-tinted stained glass. At the southern end is the splendidly canopied throne; near the centre is the woolsack; at the end and sides are galleries for the peeresses, reporters, and strangers; and on the floor of the house are the cushioned benches for the peers. The House of Commons, 62 feet long, 45 wide, and 45 high, is less elaborate than the House of Peers. The Speaker's chair is at the north end, and there are galleries along the sides and ends. In a gallery behind the Speaker sit the reporters for the newspapers.

The two chambers mentioned do not constitute the whole palace. On the side nearest Westminster Abbey are St. Stephen's Porch and Corridor, the Chancellor's Corridor, the Victoria Tower, Royal Staircase, and numerous courts. At the south end are the Guard Room, Queen's Robing Room, Royal Gallery, Royal Court, and Prince's Chamber. Libraries and committee-rooms line the river. On the north are the Clock Tower and Speaker's residence. The Victoria Tower, at the south-west angle of the palace, is one of the finest in the world, and is 75 feet square and 310 feet high. The Clock Tower is 40 feet square and 320 feet high, and has four fine bells, varying from $1\frac{1}{2}$ to $4\frac{1}{2}$ tons in weight, to strike the quarters. The clock is the largest in this country. There are four dials on the four faces of the tower, each 22½ feet in diameter; the hour figures are 2 feet high and 6 feet apart; the minute-marks are 14 inches apart; the hands weigh more than 2 cwt. the pair; the minute hand is 16 feet long, and the hour hand 9 feet; the pendulum is 15 feet long, and weighs 680 lbs.; the weights hang down a shaft 160 feet deep. Besides, there is a Central Tower, rising over the octagonal hall to the height of 300 feet.

St. James' Palace is an elegant brick structure, fronting Pall Mall. It occupies the site of a lepers' hospital, dedicated to the saint. It is asserted that Holbein designed the house, which has been much favoured by royalty. Here Mary resided and died; here Charles II., the "Old Pretender," and George IV. were born. Queen Anne, the Georges, and William IV. also made the palace their residence; and here the Emperor of Russia, King of Prussia, and Marshal Blicher lodged in 1814. Westward lies the Ambassadors' Court (ambassadors to the United Kingdom are still accredited to the Court of St. James), and beyond it the Stable Yard, where stands Stafford House, the splendid residence of the Duke of Sutherland.

On the site of Buckingham Palace originally stood the mansion built in 1703 for the Duke of Buckingham. George III. purchased it in 1761 for £21,000. It retained its original condition until 1825, when Nash undertook its reconstruction. In 1837 Queen Victoria took possession of the palace, and she has continued to reside there when in London ever since. Extensive alterations have been made to render it more suitable for her Majesty, and a new front was erected from the designs of Mr. Blore. The private apartments extend along this front.

In the gardens, which are 40 acres in extent, stand a pavilion, embellished with many paintings, and the chapel where the court attends divine service.

The Tower of London is a cluster of houses, towers, barracks, armouries, warehouses, and prison-like edifices, situated on the north bank of the Thames. The date of its erection is undecided; but it is well known that the great square tower in the centre, called the White Tower, was built by William the Conqueror. Such is the origin of the fortress; by successive monarchs it was greatly extended, and in the twelfth century received the addition of a moat, which was much improved by Charles II., and finally drained in 1843.

Of the various divisions of the Tower, the Armoury is exceedingly interesting. The Jewel House within the Tower was kept by a particular officer called the "Master of the Jewel House," formerly esteemed the first knight bachelor of England. The Regalia are arranged in a glazed iron case in the centre of a well-lighted room.

The Bank of England covers a quadrangular space of 4 acres, with a street on every side; and its buildings are of one storey, having no windows towards any of the thoroughfares. The external architecture is not such as to attract much attention, if we except the north-west corner, which was copied from the temple of the Sibyl at Tivoli. The interior, which is well arranged for business, contains nine courts in addition to the offices. A history of the bank and its management is given in the article BANK, BANKER, BANKING.

The Royal Exchange, a quadrangular edifice in Cornhill facing down Cheapside, was erected for the convenience of merchants and bankers, after the designs of William Tite, and was opened by Queen Victoria, 28th October, 1844. The sculpture in the pediment was by R. Westmacott, jun. The Exchange consisted until 1884 of an open court surrounded by a colonnade, but in that year the interior court was covered in with an iron and glass roof of a very substantial and elegant description. A marble statue of her Majesty, by Lough, stands in the centre opposite the façade. The building is said to have cost £180,000, but is now much disfigured externally by shops, in opposition to the firmly expressed wishes of its architect.

In the east part, up stairs, are Lloyd's Subscription Rooms, which are entered near the eastern gate. On the architrave of the north façade of the Exchange are three inscriptions in relief, each divided by a simple moulding. The one on the left of the spectator is the City motto, "*Domine, dirige nos*," and that on the right, "*Honor Deo*." That of the central department is "*Fortunam per*," the motto of Sir Thomas Gresham, the founder of the first Royal Exchange, 1566, which was opened by Queen Elizabeth, 1570.

The Custom-house, situated in Lower Thames Street, between London Bridge and the Tower, and facing the river, occupies a site on which smaller custom-houses formerly stood. It was erected in 1814-17, after the designs of Mr. David Laing; but in consequence of a defect in the piling the original structure was pulled down, and the present front erected by Sir Richard Smirke. Nearly one-half of the customs receipts of the United Kingdom are collected here. The most noticeable feature of the building is the Long Room, 190 feet long by 66 feet broad.

Close to the Custom-house is the Billingsgate Fish Market, a very large and commodious structure, erected partly on the site of a smaller one in 1877. See BILLINGSGATE.

The General Post-office, near St. Paul's, Cheapside, and Newgate Street, stands on the site of the Collegiate Church of St. Martin-le-Grand, and was built 1825-29, from designs of Sir R. Smirke. The building is a good specimen of the Ionic style, with a lofty portico, beneath which is the entrance to the spacious hall, 80 feet long, 60 feet wide, and 53 feet high. A Telegraph Office has been built on the opposite side of the street, and increased accommodation has been added to the Post-office for the easier transaction

of its rapidly-increasing business. A large building was erected for the Savings' Bank department in Queen Victoria Street, in 1880, and is in every respect well adapted for the requirements of that branch of the post-office service.

A palatial building in the Strand, known as Somerset House, was erected in 1549 by the Duke of Somerset, Protector during a part of the minority of Edward VI. On his attainder it became crown property and a royal residence. That edifice was entirely removed in the reign of George III.; and on the spot was erected, from designs of Sir William Chambers, about the year 1780, the fine quadrangular structure which is now devoted to the accommodation of various government offices. This building has its main front towards the Strand, while on the rear it has a façade overlooking the Thames Embankment. The river frontage is 600 feet long, and is an excellent specimen of Palladian architecture. The ranges of buildings contain offices for several government departments—especially the Inland Revenue, the Registrar-general, the Exchequer and Audit—and the Probate Court.

To the south of Lincoln's Inn, between the site of Temple Bar and St. Clement Dane's, at the east end of the Strand, rise the Royal Courts of Justice, more commonly known as the New Law Courts, a vast and magnificent Gothic pile, built by Mr. G. E. Street, with a frontage towards the Strand of about 500 feet. The building cost about £750,000, and it was formally opened on 4th December, 1882, by the queen, in the presence of the lord chancellor, the prime minister, and the other chief dignitaries of the realm. It contains in all nineteen court rooms, and besides an immense number of various offices, a large central hall, 238 feet long, 48 feet wide, and 80 feet high.

The Treasury, the Home Office, the Privy Council Office, and the Board of Trade together occupy the handsome range of buildings at the corner of Whitehall and Downing Street. Close to these offices is another large block of new government offices—the northern side forming the Foreign Office, the western the India Office, and the eastern being occupied by the Home and Colonial Offices. The "*Battle of the Styles*," as it has been called, concerning these new offices when they were about to be built, was fought for many years, and ended in a compromise; a Gothic architect (Sir G. G. Scott, R.A.) was employed, but an Italian design was adopted, for the new Foreign and India Offices, and a magnificent erection was the result. A noble Gothic building, known as the National Record Office, Fetter Lane, contains public documents and MSS. relating to this country of both ancient and modern times.

There are twelve bridges other than railway bridges over the Thames within the metropolitan area, the most easterly being London Bridge, and the most westerly Hammersmith Bridge. Of some of these we supply a few particulars, in addition to the information already given under BRIDGE. London Bridge, 928 feet long, with five semi-elliptical arches, was constructed by the celebrated John Rennie. The first stone was laid in 1825, and the bridge publicly opened six years later. It is built of granite, and is said to have cost £2,000,000. The centre arch is 152 feet span, with a rise above the water mark of 29 feet 6 inches; the two arches next the centre are 140 feet in span, with a rise of 27 feet 6 inches; and the two abutment arches are 130 feet span, with a rise of 24 feet 6 inches. The lamp posts are made from cannon captured during the Peninsular War. It has been ascertained that the number of vehicles and equestrians daily crossing the bridge in the course of twenty-four hours exceeds 20,000; and that the number of pedestrians who pass across the bridge daily during the same space of time is not fewer than 120,000.

Southwark Bridge, 708 feet long, with three cast-iron arches resting on stone piers, was also designed by Rennie, and erected by a public company at the cost of £800,000. The first stone was laid in April, 1815, and the bridge

opened to the public April, 1819. The span of the centre arch is 240 feet, and the entire weight of the iron employed on the bridge amounts to 5780 tons. In July, 1866, the bridge was purchased by the corporation of London for £200,000, and the charge for toll removed.

Blackfriars Bridge, opened by her Majesty 6th November, 1869, is an admirable specimen of engineering. It has five arches of wrought iron, surmounted by a Venetian-Gothic cast-iron balustrade. Facing the river in front of the piers are short massive columns, about 7 feet in diameter, of polished red granite, with carved capitals of Portland stone. The roadway of the bridge is 75 feet between the parapets. The view of the structure from the river, and the view eastward from the bridge itself, is much injured by the close proximity of the London, Chatham, and Dover Railway Bridge.

Waterloo Bridge, at the time of its erection, was considered the noblest stone bridge in the world; it was designed by John Rennie, and cost above £1,000,000. The first stone was laid in 1811, and the bridge opened to the public on the second anniversary of the battle of Waterloo, 18th June, 1817. It consists of nine elliptical arches of 120 feet span, supported on piers 20 feet wide at the springing of the arches. The bridge and abutments are 1380 feet long.

Westminster Bridge, built by Mr. Page, the finest and handsomest structure of the kind in the metropolis, stands upon the site of a former erection, of which the design was due to one Charles Labeledy, a Swiss. It is double the width of the old bridge, measuring 85 feet, and has seven iron arches (that in the centre having a span of 120 feet), resting upon stone piers, whose foundations descend 30 feet below low-water mark. It is 1160 feet long, and the centre arch rises 22 feet above high water. The piers rest upon bearing piles of elm, driven 20 feet into the London clay, and are cased with iron piles closely united, forming a sort of permanent cofferdam. Upon these is laid a stratum of concrete, forming a foundation for the blocks of Cornish granite used in the stone-work. Its construction cost about £4 per square foot.

Vauxhall Bridge, connecting Kennington and Millbank, is built of iron, and has nine equal arches. It was constructed from the designs of James Walker, and commenced 9th May, 1811, and opened 4th June, 1816. It is 806 feet long, 36 feet wide, and is built on caissons. The total cost of erection was £300,000.

The Albert Bridge at Chelsea, constructed upon Mr. Ordish's rigid suspension principle, was built in 1871-73. The bridge starts from the site of the Cadogan Pier at Chelsea, and terminates on the opposite shore of the river at the foot of Prince Albert Road, New Battersea. The bridge has a total length of 710 feet, the roadway being 40 feet wide including the two pathways. There is a centre span of 155 feet. The foundations and piers consist of cast-iron cylinders, and the towers are of ornamental cast-iron.

Battersea Park or Victoria Bridge is an elegant iron structure, erected in 1857, from the designs of Mr. T. Page, at a cost of £88,000, and crosses the river in the neighbourhood of Chelsea Hospital and the new park at Battersea. Including the abutments it is 915 feet long, the distance between the two suspension towers being 347 feet.

Lambeth Bridge spans the river half-way between the Westminster and Vauxhall Bridges. It has three equal spans of wire cables, each 280 feet wide, supporting a wrought-iron platform; the total width being 34 feet.

The Thames Tunnel, constructed by Brunel, 1825-41, is 1200 feet long. It now forms a portion of the East London Railway Company's line, and was opened for traffic in 1874. In 1870 a new means of communication was opened below the river, known as the Tower Subway, from its starting near the Tower on the north side of the river.

Although not so great a work as the Thames Tunnel, it has proved of convenience to pedestrians. It is 1340 feet long, 7 feet in diameter, and formed 25 feet below the bed of the river.

The Victoria Embankment leads from Blackfriars Bridge towards the west, along the north bank of the Thames as far as Westminster. It was constructed in 1864-70, under the supervision of the Metropolitan Board of Works, at a cost of nearly £2,000,000. It is about 2300 yards in length, and consists of a macadamized carriage-way 61 feet wide, with a foot pavement 16 feet broad on the land side, and one 20 feet broad on the river side. It is protected on the side next the Thames by a wall of large granite blocks 8 feet thick, and being planted with trees, and partially laid out as gardens, it forms one of the finest promenades in London. It is embellished with numerous statues, and forms the site of the famous CLEOPATRA'S NEEDLE. The Albert Embankment, completed in 1869, extending along the right bank of the Thames from Westminster Bridge to Vauxhall Bridge, a distance of four-fifths of a mile, has a roadway 60 feet in breadth, and cost above £1,000,000. The Chelsea Embankment, constructed 1871-74, involved the reclamation of about 9½ acres of ground, and is the extension of one previously constructed between Vauxhall Bridge and Chelsea Hospital.

The open spaces of London, though important and valuable, are very inadequate to the needs of the inhabitants. Those of the west end rejoice in the possession of the Green Park, St. James' Park, Hyde Park, and Kensington Gardens, which, lying adjacent to each other, cover an area of about 900 acres; and those of the north-west, in the possession of Regent's Park, which has an extent of 470 acres; but the other parks of London are smaller, and are widely separated from each other. Victoria Park, in the east of London, extends to about 300 acres; Battersea Park, to 180 acres; Finsbury Park, to 115 acres; and Southwark Park, to 63 acres. Many of the open spaces of London, which were formerly favourite resorts of its citizens, have wholly disappeared: but most of the open spaces which remain are under the care of the Metropolitan Board of Works. The principal public commons near London are Hampstead Heath, about 240 acres in extent, and one of the most open and picturesque spots in the neighbourhood of London; Blackheath Common, 267 acres; Clapham Common, 220 acres; Wormwood Scrubs, 194 acres; the Tooting Commons, 207 acres; and Plumstead Common, 110 acres. Still further out are the larger spaces of Epping Forest, Putney Heath, Wimbledon Common, Richmond Park, and the beautiful gardens of Kew and Hampton Court Palace.

It is impossible within our limits to give any adequate enumeration of the public objects of interest; but among the more prominent and important, in addition to those already mentioned, are the Monument, Fish Street Hill (built in 1677 by Wren, after the Great Fire), a Doric column, 202 feet high; the columns supporting the statues of the Duke of York and Admiral Nelson, the former 137 feet and the latter 162 feet high; the Guards Memorial of the Battle of Inkermann, Waterloo Place; Marble Arch, Hyde Park; Prince Albert Memorial in Kensington Gardens, completed in 1872; and Cleopatra's Needle, Thames Embankment. Of the churches the most remarkable, after St. Paul's Cathedral, are Allhallows Barking; St. Andrew Undershaft; St. Antholin; St. Bartholomew the Great, one of the oldest churches in England, dating from the twelfth century; St. Stephen's, Wallbrook, by Wren, restored 1852; St. Bride's, Fleet Street, by Wren, steeple 226 feet high; St. Dunstan's in the West; St. Giles's, Cripplegate; St. Mary, Aldermanbury, by Wren; St. Mary-le-Bow, or Bow Church, Cheapside, by Wren, spire 239 feet high, and Norman crypt; St. Mary Woolnoth; St. Michael, Cornhill, by Wren; St. Olave's, Hart Street; St. Swithin's, with the

London Stone; St. Vedast, Foster Lane; and St. Helen's, near Bishopsgate Street, a building erected over the old crypt of St. Helen's Nunnery, and dating originally from the thirteenth century. It still shows the Nun's Church, elevated a little above the parish church, the two running side by side, served by a common service. Among the statues of London may be enumerated those of Edward VI., at Christ's Hospital and St. Thomas' Hospital; Queen Elizabeth, St. Dunstan's, Fleet Street; William III., in the Bank; William IV., King William Street, London Bridge; Queen Victoria, in the Exchange, by Lough; Duke of Wellington, opposite the Exchange, and in the Tower; Sir Robert Peel, facing Cheapside; George Peabody and Sir Rowland Hill, behind the Royal Exchange. At the West End are—Charles I., Charing Cross; Generals Napier and Havelock, and Jenner, in Trafalgar Square; Pitt, Hanover Square; Lord Clyde, in Carlton Gardens; Canning, Derby, Palmerston, and Lord Beaconsfield, Westminster; Duke of Bedford, Russell Square; Fox, Bloomsbury Square; Capt. Coram, Foundling Hospital; George Stephenson, Euston Square Station; Achilles Statue, in Hyde Park, in commemoration of the Battle of Waterloo; General Outram, Robert Raikes, Robert Burns, Isambard Brunel, and John Stuart Mill, on the Thames Embankment; and Thomas Carlyle, on the Chelsea Embankment opposite Cheyne Row.

K. Newspaper Press, and Postal Facilities.—In 1813 the number of newspapers published in London was seventy-nine; at present it is about 386, of which about thirty are published daily. The increase in the circulation of the individual papers is, however, greatly more than the increase in the number of newspapers. More than one of the dailies have attained a circulation of over 200,000, while the most popular of the weeklies sells over 500,000. The *Times* is probably read more extensively than any other paper in the world, but has not so large a sale as some of the penny journals—the latter being bought more for individual reading, whereas, on an average, every copy of the *Times* is supposed to be read by at least five persons. By means of improved railway facilities, first introduced in 1875, the London daily papers can now be procured in all parts of the kingdom on the day of publication, and in all the Midland counties they are supplied to subscribers as early as the local journals. In addition to the newspapers, there are about 350 separate periodicals published in London and its environs.

The London Postal District, to which special rules relate, includes every town and village within 12 miles of the General Post Office. This area contains upwards of 2000 offices and pillar letter-boxes, and the number of persons employed by the post office is about 11,000. Of this total number over 500 are also money-order offices and post-office savings banks. Since the government have undertaken the telegraphs, 300 of the receiving houses have been made telegraph offices as well.

There are eight Sub-postal Districts, each of which has a name, an initial abbreviation, and a chief office. They are as follows:—E.C., Eastern Central; W.C., Western Central; N., Northern; E., Eastern; S.E., South-Eastern; S.W., South-Western; W., Western; N.W., North-Western.

The use of the district system is this: If a letter, arriving from the country, has on the outside the district initials as well as the address, it has a fair chance of earlier delivery; and if sent from one part of London to another, the chance of acceleration is still greater. The reason for this is, that much of the sorting is effected at the eight chief district offices, if the initials are given, to the great economizing of time. Letters are sent out for delivery in London twelve times a day. A letter posted in any part of the metropolis before four o'clock in the afternoon is (if properly initialed) delivered anywhere within the twelve-mile circle the same evening; if posted before six o'clock, is delivered the same evening within the six-mile circle.

L. Historical Notice.—Nothing is known of London with any degree of certainty previously to the invasion of the Romans, though most antiquarians are agreed that a British village or town had existed on its site for a long time before that event. In 1867 some poles were discovered in excavations made near London Wall, which General Pitt Rivers considered to be the remains of a village similar to those described in the article *LAKE-DWELLINGS*. When Tacitus wrote his "Annals," about the close of the first century, London, then termed *Londinium* (the Romanized form of some ancient British name now irrecoverable), lay on the south side of the river only. It is not mentioned by Cæsar in his account of his invasions, B.C. 55 and 54; but that may only be because it did not lie in the route he took. By Tacitus' time it was already an important emporium, though it had not gained the title of a colony. In the Itinerary of Antoninus, it is mentioned as being either the starting-point or terminus of half the routes described in the portion relating to Britain. It had an imitation of the famous "Golden Milestone" at Rome, from which all distances were measured, in the great stone a fragment of which still exists opposite Cannon Street Station, in the wall of St. Swithin's Church. This was the British *Milliarum aurum*, and served as the starting-point for all milestones. London now extended to the north shore. Constantine the Great built a wall round it on the north. During the stay of the Romans, which lasted from 43 to 409 A.D., London continued to increase in importance, and the Roman remains which from time to time have been unearthed show that the buildings erected were of a substantial and elegant character. In the early Saxon period it is probable that London suffered considerably from the invaders; but as they became settled in the land it recovered its high position, and its inhabitants were able to offer a stout and generally successful resistance to the Danes during their incursions into Britain. For its resistance to Canute the city was fined £10,500 when he became master of England, an amount which shows its growing importance and wealth. After the defeat of Harold in 1066, London submitted to William I., who in the second year of his reign granted the citizens a charter, which, written upon a slip of parchment 6 inches long by 1 inch wide, is still preserved among the archives of the city. The same monarch erected the White Tower, which now forms a portion of the Tower of London, to overawe the citizens in the event of disaffection. Under the Normans the city underwent many important changes, and many stately and imposing buildings were erected, so that in the reign of Henry I. a complaint was made that all the labourers had become carpenters or bricklayers. In the "Chronicle" of Fitzstephen, a monk of Canterbury, written about the end of the twelfth century, we have a very interesting and vivid picture of the city of London at that period, and its wealth, commerce, and grandeur are referred to in terms of glowing admiration. In 1218 the forest of Middlesex was cleared, and the citizens of London permitted to purchase land and build thereon, thus beginning the erection of that part of the metropolis which stands north of the City, and is now so populous. About 1236 provision was made for a constant supply of water, which was brought in leaden pipes from a stream at Tyburn, and stored in cisterns in the city. When the great Simon de Montfort, earl of Leicester, and founder of parliaments, stood for the liberties of England, his chief stronghold was in the unwavering sturdy citizens of London. Every time he drove hard against the false king, Henry III. would swear to observe the provisions of Magna Carta, which his father John had granted, but as soon as the pressure of the barons and the citizens was withdrawn the old tyranny began as before. When Henry attempted to seize Earl Simon in his lodgings in Southwark, the fortified "work" south of London Bridge, and had bribed the wealthier

burgesses to shut the bridge gates and cut off the earl's retreat, the Londoners *en masse* rose and threw down their own gates to drag the belated champion of freedom into safety. The king had seized the Tower, his garrison sought to escape, but they and the queen were pinned in prison, where they had thought to rule from the fortress. Civil war soon blazed out. London rang its great bell of St. Paul's, and was first to send forth its best blood; and at the battle of Lewes (1264) Londoners had the honour of standing the entire shock of the royal army led by Prince Edward (Edward I.), the best general of his time next to the great earl himself. Edward broke the ranks of the citizens and pursued them for miles, killing 3000 of them in his fierce vengeance. But London's heroism had given time to Earl Simon utterly to rout and overthrow the king's forces with the rest of his army, and Edward only returned to be taken prisoner with his father. The brave fight, defeat though it was, which London made at Lewes, whereby Magna Carta was saved, parliaments arose, and England's freedom was gained, deserves perpetual memory and honour. In 1328 Edward III. granted a charter, by which the village of Southwark was assigned to the corporation of the city of London, and placed under the jurisdiction of its magistrates. During the thirteenth and fourteenth centuries the annals of London are marked by several lamentable fires, famines, and pestilences, and the years 1380 and 1450 were marked by the "peasants' revolts," uprisings of the oppressed and starving people, under Wat Tyler and Jack Cade, in both of which the city suffered severely. In the sixteenth century the removal of the monasteries had a great effect in improving London; fifty-four large and many smaller establishments made way for factories, schools, charitable asylums, and hospitals. St. James' Palace was built, the park was laid out, and many new buildings were erected in Westminster. In 1537 the first permanent armed force in the country was raised in London, under Henry VIII., namely, the Honourable Artillery Company, which still flourishes in its ancient barracks in the City Road. At this time London was forced to be well prepared amidst the shifting and dangerous times. During the seventeenth century, in the great Civil War, London, which had been most exposed to the exactions of the Star Chamber, espoused the Parliamentary cause, and the citizens erected a strong earthen rampart, flanked with bastions and redoubts, for the defence of the city against the Royalists. The "trainbands" of London earned honourable distinction throughout the war. London witnessed the execution of Charles I. in 1649, saw Cromwell proclaimed lord protector in 1653, and in 1660 saw Charles II. placed on the throne at the Restoration. In 1664 it was visited by the plague, which did not stay its ravages until 100,000 of the citizens had fallen victims; and in 1666 the Great Fire swept away 13,000 houses and ninety churches, and many public buildings. It must ever be regretted that the designs of Sir Christopher Wren for the renovating of the city were not adopted, but the metropolis which arose from the ruins was a vast improvement on that by which it had been preceded. Though still too narrow, the streets were materially widened; the new houses were constructed of brick instead of wood; party walls were introduced; the old practice of making each storey project over that immediately below was abandoned; obstructions and filth of all sorts were removed; and the sewerage and pavement of the streets were vastly improved. A fire which happened in Southwark ten years afterwards afforded an opportunity for carrying similar improvements into that part of the metropolis. The population and trade of the city now increased more rapidly than before. The revocation of the Edict of Nantes occasioned the immigration of a great number of French, who settled in Spitalfields and St. Giles's. The parishes of St. Anne and St. James were formed, the district called the Seven Dials was built,

Piccadilly began to extend west, and Soho and Golden Squares were laid out. St. Paul's Cathedral was almost completed; the parish of Wapping was formed east of the City; the Post Office was instituted; and several misnamed asylums, such as Alsatia, were abolished.

From this period the increase of London and the progress of improvement continuously advanced. In the early part of the eighteenth century an Act was passed for building fifty new churches in and about the metropolis, most of which were completed within a few years, and some of them are still among its ornaments. Houses sprang up on every side, and by the middle of the century the west end of the town, as far as Hyde Park, became a compact mass of buildings, reaching beyond Oxford Street on the north, and extending east from Portman Square, across Tottenham Court Road, past Montague House and Gray's Inn Gardens, through Clerkenwell, Finsbury Square, Spitalfields, and Whitechapel to Wapping. Before this time water-works had been formed at Chelsea in aid of the supply furnished by the New River. Sewers had become more general, lamps had been fixed in all the principal streets, the Bank of England and Westminster Bridge were built, St. Paul's completed, and Fleet Ditch arched over. In the last half century old Blackfriars Bridge—taken down in 1865—was built, the houses encumbering London Bridge were removed, the Mansion House was finished, and Somerset House erected. At the same time many unsightly and inconvenient buildings were removed; lamps were much increased in number, and lighted during the whole night; raised footways became universal, and the shops, which before were mere stalls, assumed a size and splendour evincing the wealth of their occupiers, and greatly contributing to the ornament of the town.

During the present century London has made great advances. Within this period eight bridges have been built, extensive docks have been excavated, gas has been introduced into every street and alley; a gigantic system of drainage has been completed; steam, on the river, the sea, and on railways has given it an almost unlimited power of intercourse with every part of the kingdom and of the world; new and handsome markets have been erected; great thoroughfares, lined with imposing and substantial buildings, have sprung into existence, and efforts have not been wanting to improve the external appearance of the metropolis and remove it from the reproach of ugliness under which it has so long been content to remain. During late years also a feeling in favour of improved municipal arrangements has been evoked, and though any measure which may be introduced to bring this about is sure to be opposed "clause by clause and line by line" by those interested in the maintenance of the present abuses, there is every prospect that within a few years a municipal government extending to the whole of the great metropolis will be organized, and the way thus opened for the carrying out of the reforms which still await execution.

Books on London.—Concerning the books written upon London it may be said their name is legion, and a complete collection would fill a large library. Among the earliest accounts of the great city are those of Fitzstephen (written in the reign of Henry II., but first printed with Stow's Survey in 1598); Arnold's "Chronicle, or the Customs of London" (1502); Stow's "Survey of London" (1598, 1603); the same work continued by J. Strype (1720); Maitland's "History of London" (first edition, 1739; fifth edition, 1775); and Pennant's "London" (first published in 1790, and frequently reprinted since). Of later works we can only mention Peter Cunningham's "Handbook of London" (1849; new edition, 1850); "Curiosities of London," by John Timbs; "Old and New London" (1873-78), written by W. Thornburg and E. Walford; and Charles Knight's "London" (1841-44, revised by E. Walford, 1875-77).

LONDON CLAY is one of the members of the Lower Eocene, as developed in the London Tertiary basin; in the Hampshire basin its equivalent is the Bognor series. As typically developed it consists of a stiff-brown and bluish-gray clay; through it are calcareous layers of septaria nodules, and among the basal beds there are sand and pebble beds. The London clay attains a maximum thickness of about 500 feet near Newbury, in Essex, thinning out considerably westward. In the Hampshire basin its representative is under 300 feet thick, and is well seen at Alum Bay and Whitecliff Bay.

This deposit is rich in fossil remains, which indicate that the beds were accumulated in evident proximity to a large continental area; that the lowest beds were formed in comparatively deep water, but that there was a gradual shallowing of the seas while the succeeding beds were being deposited. The predominating fossil remains are those of marine mollusca; they are mostly of forms indicating tropical conditions where they lived. Of these gasteropods are the most numerous; lamellibranchs are also well represented; but of brachiopods there are only a few species. The cephalopods were represented by the still existing genus *Nautilus* and some other forms. Crustaceans abounded; among the prevalent forms the early crabs *Hoploparia* and *Xanthopsis* may be mentioned.

Fishes are represented by a large number of species; their remains occur most plentifully at the Isle of Sheppey. Rays and sharks were especially numerous, but a sword-fish (*Xiphopterus priscus*) and a saw-fish (*Pristis bidentatus*) 10 feet long, have been found. Reptiles also were numerous; they included, besides turtles and tortoises, two species of crocodiles and a sea snake as long as the largest existing serpent. Bird remains also have been found among them—one, *Lithornis gutturalis*, was allied to the vulture, and another, *Halgimornis impudens*, to the king-fisher. Of mammals there are representatives of several orders, as the remains of a marsupial or opossum, a bat, a species of hog, besides several tapir-like animals.

The flora of the London clay is that of a country where tropical conditions prevailed. A large number of seeds and fruits have been found at the Isle of Sheppey. Conifers, laurels, figs, junipers, and leguminous plants evidently abounded on the adjacent land; of these the genera *Pinus*, *Sassafras*, *Nipadites*, *Quercus*, and *Eucalyptus* may be mentioned.

The nature of this deposit and its contained fossil remains indicate that it was laid down either in a large estuary or in the sea close to the embouchure of a large river. The conditions prevailing near the mouth of the Amazon or the Ganges at the present day are considered to be similar to those that existed during the deposition of this formation.

The strata of the London clay are largely used for making Roman cement, and the clay itself makes good brick.

LONDON, UNIVERSITY OF, owes its establishment to the formation of what was at first called the London University, and is now University College, London, created as it was by the institution of King's College. In order to promote the objects of these schools it was found necessary that a body should be formed, with the power and means of examining the students and the right of conferring degrees. The original charter given by King William IV. was a temporary one. Queen Victoria, in the first year of her reign, revoked it and granted a new one; additional powers were given in 1859, a wholly new charter in 1878, and the charter now in force superseding all others, bears date 6th January, 1863. The reasons for this succession of charters was that experience gradually suggested changes in the organization. One of the most natural of these was, that when a body of London University graduates had once been formed it was found necessary

to admit them to some share in the government of the university of which they were the offspring. Accordingly the university now consists of a chancellor, vice-chancellor, a senate of thirty-six fellows, and the body of graduates. The chancellor, vice-chancellor, and fellows really rule, and make whatever fresh changes from time to time the charter has left to their discretion; but the graduates in convocation have a deliberative power on all matters concerning the university, and also a certain power in the nomination of new members of the senate. With all these changes the university still remains essentially what it was in the first instance—not a teaching body, nor a body growing out of or representing any group of teaching bodies, like the universities of Oxford and Cambridge, and those of Scotland, but simply an institution for ascertaining, by means of examination, those persons in any part of the British dominions who have acquired proficiency in literature, science, and art, and of rewarding them by academical degrees. The queen is the visitor, and to the crown is reserved the power of from time to time appointing a number of fellows in turn with convocation. The chancellor is also appointed by the crown. The office of vice-chancellor is an annual one, and is filled by election by the fellows from their own body. The Reform Act of 1867 conferred on the university the privilege of sending a member to represent it in the House of Commons. The executive officer of the senate is the registrar.

An examination for degrees must be held once a year at least. The candidates are examined in as many branches of general knowledge as the senate shall consider most fitting, in short in every subject of a liberal or professional education—excluding only theology. The examiners are appointed by the senate, either from their own body or otherwise. The senate confers, after examination, the degrees of Bachelor of Arts, Master of Arts, Bachelor and Doctor of Laws, of Science, of Medicine, of Music, Doctor of Literature, Master in Surgery, &c. Under the provisions of a supplemental charter of 4th March, 1878, they also now grant degrees to women in every subject under exactly the same conditions as to men. It must be evident that in an institution such as the one under notice—which is, in fact, nothing but a first-class examining body, empowered to grant degrees—everything must depend upon the examiners; and the highest functions of the senate are the election of these gentlemen, and the discussion with them from time to time of the proper methods and subjects of examination. The examiners are appointed but for a limited term, so that there may always be a reinforcement among them of fresh men. The present body of the examiners includes men of the highest distinction, some of them graduates of the university itself, others of Oxford, Cambridge, or Dublin, or one or other of the Scottish universities; and that the examinations have ever been of a very superior quality is proved by the value everywhere set on a London degree.

For many years the university had no building of its own, but was quartered in a wing of Burlington House. In May, 1879, however, a very handsome edifice, which had been erected for it by the government in Piccadilly, was opened by her Majesty. It faces Burlington Gardens and adjoins the Royal Academy of Arts. The façade is decorated with a series of statues of eminent men, selected as fitting illustrations of the various forms of academic culture. The interior contains a spacious lecture-room, a number of other apartments in which the examinations take place, and a valuable library.

LONDONDERRY, a county of the province of Ulster, in Ireland, bounded N. by the Atlantic Ocean, E. by Antrim and a portion of Lough Neagh, S. by Tyrone, and W. by Donegal. The greatest length, north to south, is 40 miles; the greatest breadth, east to west, 34 miles. The area is 816 square miles or 522,315 acres, of which

190,000 are under tillage, 200,000 in pasture, 5000 in plantations, and 110,000 waste, bog, mountain, &c. The population in 1881 was 164,991.

Surface and Rivers.—The county is of an irregularly triangular outline. From the Bann the surface gradually rises westward for about 10 miles, forming a chain of elevations which bound the valley of that river on the west. Westward of these elevations is an extensive tract of undulating country, extending from their bases to the eastern shore of Lough Foyle, and bounded on the south by the mountain range which separates the counties of Londonderry and Tyrone.

The Lower Bann, from Lough Neagh to the sea, a distance of upwards of 30 miles, has a fall of only 48 feet. The general characteristics of this district are similar to those of the north coast of the county of Antrim. The elevations are, however, inconsiderable, and the general aspect of the country is tame and bleak. West of the sandbanks which occur at the embouchure of the Bann the coast has a bolder outline, rising in a series of precipitous cliffs over the sandy beach. Among the loftiest basaltic cliffs are Benbradagh, 1531 feet high, and Craignashock, 1773 feet high. West of the valley of Ballynascreen commences a mountain chain, which with little interruption extends to the valley of the river Foyle, forming the boundary between the counties of Tyrone and Londonderry. Its chief heights are Sawell, 2236 feet high; Muinard, 2057 feet high. The district included between these mountains and Lough Foyle, constituting the western division of the county, is divided by a central tract of high land into the valleys of the rivers Roe and Faughan. Between the Lower Faughan and the Foyle is a range of undulating ground crossed by a valley, through which the highroad, leading over a bridge, completes the communication with Londonderry city.

The most remarkable feature of the coast-line is the tract which extends from the north-western extremity of the hilly region to the low point of Magilligan and southward to the mouth of the Roe. On this tract is measured the base-line of the trigonometrical survey of Ireland, 53,200 feet in length. The same tract appears to occupy the greater portion of the bottom of the lough, and rises towards its centre in a bank which confines the navigation to that portion of Lough Foyle lying along the coast of Donegal. The lough is about 18 miles long by 10 broad. The entrance to the lough, between Magilligan Point and Enniskillen Head, is about a mile across, and from this point to Londonderry city is a safe and tolerably sheltered navigation of 23 miles. Eastward of the entrance is a shoal called the Tuns, which renders the lough difficult of access in stormy weather. The chief rivers of the county are the Bann, Foyle, Macosquin, Agivey, Clady, Mayola, Ballinderry, Roe, Faughan, Owenreagh, and Owenbeg. The roads of Londonderry are generally excellent. There are no canals.

Geology, Soil, Productions.—The basaltic tract, which forms the eastern section of the county, corresponds in all respects to the remainder of the field on the Antrim side of the Bann [see GIANTS' CAUSEWAY], with this remarkable difference, that the dip of the strata is reversed. The geological structure of the district may be described as a floor of primitive rock overlaid in part by a field of secondary formations, capped by basalt. The main constituent of the western section is mica slate. Primitive limestone occurs in many places, and on the east side of Slieve Gallion there is a granular limestone which contains quantities of crystallized hornblende; hornblende slate is found at several places in the valley of the Roe. The structure of the south-eastern extremities of the county is more complex, the varieties of formations which appear at the surface being numerous. There are no mines worked in this county.

The soil of that part of the valley of the Bann where the subsoil is hard basalt, consists for the most part of a rusty loose grit, without sufficient strength or cohesion for wheat crops. Numerous tracts of bog, interspersed with shallow pools, and frequently separated by craggy knolls of basalt, are scattered over this part of the county. There are, however, tracts of good land along the banks of the several rivers which traverse the district, and especially at their junctions; and between the basalt and the primitive district further west is a tract of rich open country, extending southward into Tyrone. This is the most extensive tract of good ground in the county. The best improved portions of the county are the district of Lough Neagh, the valley of the Roe, the valley of the Faughan, and the immediate vicinity of Londonderry on both sides of the Foyle. There is a very general scarcity of timber.

The progress of agriculture in this county has been materially forwarded by the establishment of an agricultural school near Muff by the Company of Grocers of London, who here hold large estates. The chief crops are oats, barley, potatoes, and flax, with some wheat. The breed of cattle, of which great numbers are reared, forms a principal source of the wealth of the county. The export and import trade of the county is carried on at the ports of Londonderry and Portrush, the latter being the seaport of Coleraine. The county returns two members to the House of Commons.

History and Antiquities.—At the most remote period this county appears to have been possessed by a branch of the O'Connors of Cashel, who were in time subdued by the O'Kanes, and reduced to the rank of peasants. Dungiven was the principal residence of the O'Kane chiefs, who, though sovereign princes within their own principality, were tributaries, sometimes to the O'Loughlins, but usually to the O'Neils of Tyrone. The establishment of an English garrison at Coleraine enabled the English very soon after to reduce at least the eastern and central parts of the county into shire ground. It is probable that the English law continued in force in the eastern parts of the county until the great revolt of the O'Neils in 1333. After that period the native Irish continued undisturbed masters of the county until the middle of the sixteenth century, when the rebellion of Shane O'Neill, in 1568, made it necessary to send a force to Derry. In the year 1600 Sir Henry Dockwra, with an efficient force, constructed three forts in the county; and this was the first commencement of a permanent settlement. The rebellion of Sir Cahir O'Dogherty in 1608, and the flight of Tyrone and Tironnail in the preceding year, left this and five other counties at the disposal of the crown. On the 28th January, 1609, negotiations were commenced between the king and the corporation of London for the purpose of settling the terms on which the forfeited lands in the county should be conveyed to the latter for the purpose of planting them with Protestant colonists. It was at first agreed that the Londoners should spend £20,000 on the plantation, in consideration of which the king granted to them the old county and town of Coleraine, with the woods of Glancenkene and Killeightra, and the town and liberties of Derry, excepting the church lands. The corporation still retains these estates, whose management is vested in a body of twenty-six, consisting of a governor, deputy-governor, and assistants, of whom one-half retire annually. In 1619 this body was incorporated by royal charter, and their estates erected into one county, hence called the county of Londonderry. Some parts of the county, however, were assigned to the civic companies. The introduction of the new colony changed the entire face of the country, which up to this period had been one of the most desolate tracts in Ireland.

There are some remains of a Cyclopean fortress at the Giant's Sconce, on the road from Newtown-Limavady to

Coleraine. Dungorfin is a circular mount, surrounded by a wet ditch, near Claudy. There are several cromlechs, druidical remains, caves, and tumuli. Of military edifices, the only ones remaining are the castles of Killaloe, Dungiven, Salterstown, and Muff. The old abbey of Dungiven, which occupies a romantic site on a rock rising 200 feet above the bed of the river Roe, and the old church of Banagher, are the chief ecclesiastical remains.

LONDONDERRY, commonly called *Derry* (in Irish the "place of oaks"), a county of a city, parliamentary borough, municipal borough, and seaport, 114 miles N.N.W. from Dublin, is situated on an oval-shaped hill, 119 feet above high water, which projects into the Foyle from the western bank, and 5 miles above the entrance of the river into the estuary called Lough Foyle. The ancient part of the city is surrounded by a wall, a mile in circumference, with six gates, beyond which the houses have been considerably extended. The streets radiate from a central square, and some of them are very steep. An iron bridge, the finest of its class in Ireland, measuring 1172 feet from one abutment to the other, and connecting the city with the suburb of the Waterside, has been erected over the Foyle. The principal public buildings are the corporation hall, the county and city court-house, the jail, the lunatic asylum, infirmary, Gwynn's Institution, the Magee College, Foyle College, and the district national model school. Among ecclesiastical edifices, the cathedral, and three other churches, including the Waterside, belong to the Episcopalians; seven, also including the Waterside, are Presbyterians; four are connected with the Methodists; and three with the Roman Catholic body, one of these edifices being a fine and costly building intended for a Roman Catholic cathedral. The shirt manufacture is a highly important trade in Derry, which is now its great centre in Ireland. Great improvements have been made in the harbour, including an extensive graving dock; and the quays reach from the new bridge down to Pennyburn, a distance rather more than a mile in length, at every point of which there is ample depth of water, even for large vessels, in all states of the tide. Derry is now the Irish port of call for the Montreal Steamship Company's steamers, which bring mails and passengers from British America to Ireland, and carry mails and passengers from Derry to the British provinces and the United States. The foreign, colonial, and coasting trade of Derry is very considerable, and the port is a central outlet for emigrants from the north-west of Ulster. There are regular lines of well-appointed steamers constantly plying between Derry and Liverpool, Glasgow, Ardrossan, &c. The number of vessels registered as belonging to the port in 1885 was thirty (10,000 tons); the entries and clearances each average 1500 (300,000 tons) per annum. The exports consist chiefly of provisions, grain, eggs, butter, flax, tow, and linen, with hides, skins, salmon from the productive fisheries on the Foyle, &c. There are flax-spinning mills, flour-mills, breweries, distilleries, shipbuilding and rope-works, foundries, &c.

The population of Derry at the census of 1881 was 29,162—an increase of 3820 since 1871. The assizes for the county are held in Derry; and the borough is divided into three wards, which return eighteen councillors and six aldermen to the town council. The city sends one representative to the House of Commons. There is a recorder's court, with large jurisdiction in civil cases and considerable powers in criminal charges. The Magee College is the principal literary institution in Derry; it is under the government of the General Assembly of the Irish Presbyterian Church; its curriculum, which is formed on the model of the Scottish university system, embraces a complete course of instruction in literary, scientific, and philosophical knowledge, as well as in theology, biblical criticism, ecclesiastical history, and Oriental literature, including a number of the principal living languages of the East.

The undergraduate course is open to the public of all denominations; and the theological classes are chiefly, though not exclusively, attended by students intended for the Presbyterian ministry. The diocesan library, which is kept in Foyle College, is open to the literary public; it was originally the gift of Archbishop King, when he was bishop of Derry, to the citizens, and it contains a large number of rare and curious works.

The great event in the history of Derry is its gallant resistance to the army of King James in 1689, when it sustained a siege of 105 days, during which the inhabitants endured the most terrible privations. The commemoration of this portion of its history by the ultra-Protestants has frequently led to serious disturbances. A fine monumental pillar has been erected on the city wall to the memory of the Rev. George Walker, who had been very active during the siege, though not the actual "governor" of the city, as he has been commonly, but incorrectly, called.

LONDONDERRY, ROBERT STEWART, MARQUIS OF, better known as *Lord Castlereagh*, an eminent Tory statesman of the old school, was born at Mount Stewart, county Down, Ireland, 18th June, 1769. He was educated at the grammar-school of Armagh and St. John's College, Cambridge. He made his maiden speech in the English House of Commons, to which he had been returned for the borough of Tregony, 29th October, 1795, in seconding the address. In the beginning of 1798 he was made secretary to the lord lieutenant and an Irish privy councillor. He sat for the county of Down in the Imperial Parliament from 1801 until 1805, when he was promoted from the presidency of the Board of Control to be secretary of state for the department of war and the colonies. The failure of the Walcheren expedition not only made him very unpopular, but involved him in a personal quarrel with Mr. Canning, who was severely wounded in the duel that resulted from it. Lord Castlereagh was next appointed secretary of state for the foreign department. To the Parliament which met in November, 1812, he was returned for the county of Down; and he also retained that seat in the next two Parliaments. In 1813 he went as British plenipotentiary to the negotiations opened with the French government at Châtillon; and he also appeared as representative of the King of England at the various congresses down to that of Aix-la-Chapelle in 1818. He was made a knight of the Garter in that year, and became Marquis of Londonderry by the death of his father on the 8th of April, 1821. Lord Londonderry died by his own hand on the 12th of August, 1822. As a statesman he was unscrupulous and strongly devoted to his party, but his private character was irreproachable. His intellectual power was not pre-eminent, and his parliamentary oratory was marked by clumsiness of expression and much confusion of metaphor. Although he was a supporter of the principles of Catholic emancipation his name had become identified, through his rigour and narrowness, with the worst features of the repressive policy of the government, and when he was carried to his grave in Westminster Abbey a shout of exultation from the assembled populace was only partially and with difficulty suppressed.

LONG, one of the notes of ancient music, denoted by a square-headed black note with a tail.



Its true value was half that of the *Large*, and double that of the *Breve* or short. (The latter is now our longest note.) In later plain-song music the long was not considered as double the breve, but only as somewhat longer, the amount being variable. Its form also varied, and came to be a hollow square (or square white note) with a tail, though the original shape was always retained for plain-song.

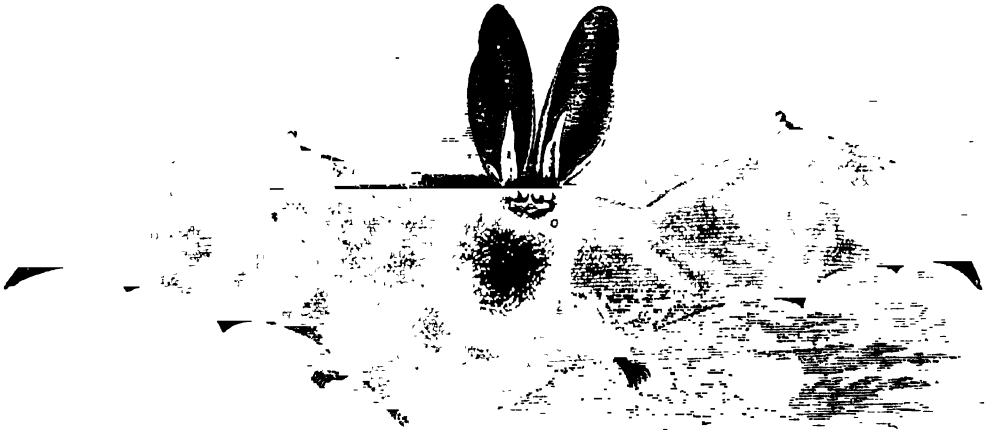
LONG ISLAND, an island off the east coast of the state of New York, of which it forms a part, and the south coast of Connecticut, and separated from both by Long Island Sound. It is about 120 miles in length from east to west, and its greatest width is 24 miles. Its total area is 1682 square miles. Its north and east coasts are deeply indented, Gardiner's and Great Peconic Bays on the north, extending 30 miles inland, and Great South Bay and others smaller on the south-east, forming long sheltered lagoons. The surface, a little broken on the north, nowhere rises into hills; the soil is fertile and highly cultivated. It is connected with New York at Brooklyn by a vast suspension bridge, and is traversed throughout by a railway from Brooklyn on the south to Greenport on the north. Williamsburg, north of Brooklyn, is joined by railway to Flushing, 10 miles north. There is a lighthouse on Montauk Point, and others at several places on the south and east coasts. The heights of Brooklyn and many other parts of the island were famous during the War of Independence.

LONG VACATION is a time when lawsuits are suspended in the English courts. It is from the 10th August to the 24th October in every year. Vacation judges, however, may dispose of any urgent business arising during this period. The universities and public schools have a long vacation of nearly the same length: Cambridge from about

24th June to 1st October, Oxford from about 11th July to 10th October.

LONG'GAN is the fruit of *Nephelium Langanum*, and therefore very closely allied to the *LITCHI* and the *RAMBUTAN*. Like these fruits, the longan is eaten in China as a dessert fruit. It has a thin brittle shell of a yellowish-brown colour, almost smooth, inclosing a semitransparent pulp of a slightly acid flavour. The flowers differ from those of the Litchi in having petals, and in the calyx being deeply five-lobed. The fruit is smaller and the shell less rough. The genus *Nephelium* belongs to the *SAPINDACEÆ*.

LONG-EARED BAT (*Plecotus auritus*) is the commonest BAT in England. It is known by the extraordinary size of the ears, which are nearly as long as head and body combined. The ears are membranous and almost transparent, and in repose or during hibernation are folded down under the wings. The *tragi* or earlets are very long and tapering, and when the ears are folded project from the head like a pair of horns. The tail is long and almost entirely inclosed in the interfemoral membrane. The head and body of this bat are nearly 2 inches in length. The fur is thick and soft, of a reddish-brown colour above, and brownish-gray below. The expanded wings measure 10 inches. The long-eared bat is widely distributed throughout



The Long-eared Bat (*Plecotus auritus*).

Europe and Northern Africa, extending also to Central Asia. In England it frequents the open country, but is strictly nocturnal in its habits. During the day this bat is generally found in old buildings and under the roofs of houses. When on the wing it emits a sharp shrill cry. It feeds chiefly on moths. If placed on the ground it moves forward by a peculiar jerking action from side to side, at the same time keeping the head well raised. It can be readily tamed, and makes a very agreeable pet.

LONGFELLOW, HENRY WADSWORTH, the best known of modern English-speaking poets, was born 27th February, 1807, at Portland, the capital of the State of Maine, United States of America. His father, the Honourable Stephen Longfellow, an eminent lawyer and member of Congress, was a descendant of William Longfellow, who emigrated from Hampshire in England in 1678; and on the mother's side the poet came of the family of John Alden, the first of the Pilgrim Fathers to land at Plymouth, New England, from the *Mayflower*. The birthplace of Longfellow forms the centre of a beautiful harbour in Casco Bay, which with its multitude of islands almost rivals the St. Lawrence in beauty, and there are many lovely scenes in its immediate neighbourhood. Its influence upon his

mind and heart during the days of childhood and youth is indicated in the poem entitled "My Lost Youth," where he sings of "the beautiful town that is seated by the sea." He was destined for the law, and after being educated at Bowdoin College, Brunswick, where he graduated in 1825, he spent a short time in his father's office, but soon afterwards he received the more congenial appointment of professor of modern languages in his own college. In order to prepare himself more perfectly for its duties he visited Europe, where he spent three and a half years in travelling, visiting England, France, Germany, Italy, Spain, and Holland, devoting himself to the study of languages and the history of the countries which he visited. In 1829 he returned to assume his duties at Bowdoin College, and in 1831 married Miss Mary S. Potter. During his college life he had written several poems which had been published in the *United States Literary Gazette*, some of which possessed, in great perfection, the characteristics which have rendered his poetry so widely popular. In 1833 he published a small volume of translations from the Spanish with an introductory essay, and some sketches of his foreign travels in a work called "Outre Mer."

In 1835 he was chosen to succeed George Ticknor as

professor of modern languages and belles-lettres in Harvard College, Cambridge, Massachusetts, and before entering upon his duties he paid a second visit to Europe, which extended over fifteen months, and during which he lost his wife, who died at Rotterdam, 29th November, 1835. Her memory is enshrined in the beautiful lines entitled "Footsteps of Angels." During this tour Mr. Longfellow devoted his study chiefly to the Scandinavian countries and Switzerland, and on his return in 1836 to America he began at once to lecture and write. As a professor he was eminently successful, and his writings were from the first well received both by the Americans and the British public. In 1839 he published "Hyperion," a romance, in which he combined some of the experiences of his travels with much imaginative and romantic illustration, and his first volume of original poetry, entitled "Voices of the Night." In 1841 he published "Ballads and other Poems," and the following year there appeared his "Poems on Slavery," with a dedication to Channing. In 1843 he married Miss Frances E. Appleton, and about this time he bought and occupied as his residence an old historic house in Cambridge, Massachusetts, which afterwards became famous as his home, and which he occupied until his death. Happy in his home, successful in his public work, and surrounded by true and congenial friends, the poet now spent many pleasant years, and produced some of the best of his works. Among these we may mention the dramatic poem of the "Spanish Student," issued in 1843; "The Belfry of Bruges, and other Poems," in 1845; and in 1847 the poem which many critics regard as his masterpiece, "Evangeline, a Tale of Acadie." In 1849 he published a prose tale entitled "Kavanagh," another volume of poems under the title of the "Seaside and Fireside," and in 1851 the beautiful poem illustrating so richly and quaintly the middle ages of Europe, entitled the "Golden Legend." In 1854 he resigned his professorship in favour of Mr. Lowell, and the following year his genius revealed itself in an entirely new and original production, entitled "Hiawatha." In this poem, which is founded on the scenery, traditions, characteristics, manners, and life of the aboriginal Indian tribes of America, the easier features of savage life are passed over, and the growth of an Indian love, the course of an Indian wooing and wedding, deeds of primitive heroism, and tragedies of life and death are all exquisitely blended in an atmosphere of pure and elevated imagination. The poem entitled "The Courtship of Miles Standish" and some minor poems appeared in 1858. In 1861 the life of the poet was overcast by the sudden and tragic death of his wife, who was burned to death from her dress catching fire in her own house, and this event cast a shadow over him which was never wholly lifted. In 1863 he resumed his pen, and published his "Tales of a Wayside Inn" and "Birds of Passage," in 1866 the volume entitled "Flower de Luce," and in 1867 his translation of the "Divina Commedia" of Dante. The latter is a notable achievement of faithful translation and of elegant scholarship, and it gave a great impulse to the study of Dante in America. Then came the "New England Tragedies" in 1868, the "Divine Tragedy" in 1871, "Three Books of Song" in 1872, "Aftermath" in 1873, in 1874 the "Hanging of the Crane," and the following year the "Masque of Pandora and other Poems." It is worthy of note that the later poems of Longfellow display no falling off in poetical power, while they are marked by an increase in the depth of thought they display, and their tenderness of expression and sentiment. Working up to the last he published "Keramos and other Poems" in 1878, "Ultima Thule" in 1880, in October, 1881, a beautiful sonnet on the death of President Garfield, and in January, 1882, his last poem, "Hermes Trismegistus." During the closing years of his life he suffered much from rheumatism, but he retained to the cheerfulness to the last, and it was not until the beginning of 1882 that he was compelled to

withdraw from public and social life by the illness which terminated in death, 24th March, 1882.

Although he cannot be placed in the first rank of the world's poets, and his work is not characterized by profundity of thought, subtlety of analysis, or original insight into nature, yet he has written much that will be of lasting value, and many of his short lyrics are simply perfect in thought, style, and language. One of his most intimate friends has, since his death, expressed his belief that as a man Longfellow was almost perfect, as much as it is ever given to human nature to be, and has declared that he united in his strong transparent humanity almost every virtue under heaven. Those who were privileged to have intercourse with him in daily life ever found that the influence of his character was greater than that of his works. Yet the latter are everywhere marked by a deeply reverent and religious spirit, and in melodious speech they illustrate and enforce the virtues of manliness and courage, reverence and purity, trust in the goodness of God, and sympathy and love towards men.

LONGFORD, an inland county of the province of Leinster, in Ireland, bounded N.W. by Leitrim, N.E. by Cavan, S.E. by Westmeath, and S.W. by Roscommon. Its greatest length north to south is 29 miles; its greatest breadth east to west is 22 miles. The area is 120 square miles, or 269,409 acres, of which 75,000 are under tillage, 126,000 in pasture, 4000 in plantations, and 50,000 waste, bog, mountain, &c. In 1881 the total number of inhabitants in the county was 61,009—a decrease of 3489 since 1871.

Surface and Rivers.—The general slope of the surface is westward and south-westward towards the Shannon, except in the north-eastern angle towards Cavan, where the county embraces a small portion of the basin of Lough Erne. This district, forming the immediate basin of Lough Guinagh, is separated from the remainder of the county by a slightly elevated tract upon the south, and by a series of hills of low elevation on the west. Lough Guinagh is a very irregular piece of water, extending about 5 miles each way, and is rather a collection of lakes communicating by narrow channels than one sheet of water. Its chief feeders are small streams running from the surrounding hilly country. The hills called the Cairn Clonlough present several summits nearly 1000 feet high. Between their western termination and the Shannon lies an open well-cultivated tract, while their south-eastern slope forms one side of the fertile and prosperous valley of the Camlin. The district between the Keenagh and the Shannon, which along the south-western boundary of this county expands into the extensive lake of Lough Ree, is very flat and boggy. An inlet of the lough, running about 4 miles eastward from the main sheet of the lake, bounds this part of the county on the south. Near the shore, in this direction, lie the small lakes of Derry and Derrymacarr. The valleys of the Camlin and Inny are divided by a table-land, rising into only one conspicuous eminence of 850 feet at Slieve Goldry. The Shannon bounds the county on the west. The other rivers are the Clonard, Rinn, Camlin, Keenagh, and Inny. The Royal Canal runs through the county.

Geology, Soil, Productions.—The entire district south of the Camlin consists of flinty limestone, with the exception only of two patches of sandstone. The immediate valley of the Camlin on its southern bank, and the entire tract extending northward from it to the county of Leitrim, consists of clay-slate. Between these lies a belt of yellow sandstone and conglomerate. The low gravel region, in which the eskers, curious gravel ridges, occur, contains large quantities of fine calcareous sand and marl. Marly clay also underlies many of the boggy tracts. A little millstone grit appears. Iron, coal, lead, and marble are among the mineral products. In the tract sloping towards the valley of the Inny is a rich vegetable mould, producing either

heavy grain crops or sweet fattening pasture. The rest of the county is chiefly grazing land. Great quantities of butter are made by the farmers and cotters. The chief crops are wheat, oats, potatoes, and clover.

The linen manufacture is carried on with some activity in the neighbourhood of Newtown-Forbes, where the first Earl of Granard took pains to introduce it. There are also manufactures of coarse flannels and friezes for home consumption in the county.

History and Antiquities.—The territory at present constituting the county of Longford was originally a portion of the kingdom of Meath, and as such was included in the grant of Meath by King Henry II. to Hugh de Lacy. On the erection of the district into a separate county, in the eleventh of Elizabeth, it retained few or no traces of ever having been under the authority of the English law or government. A reapparelling out of the county took place in 1615. The plantation did not take effect to any great extent, as in 1611 the county appears to have been temporarily recovered by the O'Farrells, excepting Longford Castle and Castle Forbes. The confiscations which ensued extended over nearly the entire county, and introduced almost an entirely new proprietary.

Among the antiquities is the rampart of Duncla, which extends 8 miles. On the island of Inch-Cloin, in Lough Ree, moulder the ruins of seven churches, and the foundation of a round tower. An abbey was established here, about 540, by St. Dornid. The remains of another round tower may be seen at Granard. The abbey at Longford was one of Patrick's foundations; on its site a fine monastery was built in 1400, the church of which is now the parish church. There are remains of the religious houses of Moydow, Clonebrone, Clone, Derg, and Innismore, a foundation of St. Columba's on an island in Lough Guounagh. A few castles are still partially standing, of which the principal are at Castle-Forbes, Granard, Tenallick, Castlecor, Ratheline, and Ballymahon.

LONGFORD, the capital of the county, 76 miles N.W. by W. from Dublin, is surrounded by an extensive plain of bog, swamp, pasture land, and arable land. It is watered by the small river Cumlin, which falls into the Shannon 4 miles westward from the town. It is a station on the Sligo branch of the Midland Great Western Railway, and is the most thriving place between Dublin and Sligo. It consists of regular streets, and contains a county courthouse, prison, workhouse, barracks, handsome church, a Protestant hall, fine new Roman Catholic chapel, and two or three places of worship for dissenters. The assizes are held in Longford. The population in 1881 was 4380.

LONGICORNIA is a group of beetles belonging to the section **TETRAMERA**. This group includes a vast number of large and beautiful beetles, all remarkable for the length of their antennæ, which in many species are several times longer than their oblong bodies, and for their powerful incurved mandibles. They inhabit woods, where the females deposit their eggs beneath the bark of trees, effecting the operation by means of a long, strong, horny ovipositor with which they are provided. The females are usually larger than the males. The larvæ live beneath the bark of trees or in the wood, in which they bore deeply and do much damage. The larvæ are long, flattened, cylindrical, fleshy grubs, with a dilated prothorax, sometimes footless, sometimes provided with three pairs of minute feet: the head is small, and armed with strong, sharp mandibles, adapted for boring like an auger in the hardest woods. The perfect insects live but a short time, and are met with on the trunks or branches of trees, gnawing the wood or feeding on the juices. The greatest assemblage of species and the largest forms are found in South America; but longicorn beetles are very generally dispersed. There are upwards of 8000 described species of longicorns, of which Europe only contains about 500,

and the British Isles fifty-five. This group falls only into three families, Cerambycidae, Lamiidae, and Prionidae: some authorities make these sections subfamilies, and call the whole group Cerambycidae.

LONGINUS, the author of a very famous treatise in Greek, "On the Sublime," the best Greek work of post-Alexandrine times, is said to have been born either in Syria or at Athens. Among other teachers he received instruction from Ammonios Sakkas and Plóinos. He afterwards settled at Athens, where he taught philosophy, rhetoric, and criticism, and numbered among his disciples the famous Porphyry. He finally removed to Palmyra at the invitation of Queen Zenobia, to superintend the education of her sons, and took an active part in public affairs. After the capture of Palmyra by Aurelian, in 273, Longinus was put to death by order of the emperor, because it was merely by his advice as chief minister that Zenobia threw off her allegiance to Rome. There is hardly any ancient work which is so truly critical as this elegant production of Longinus. His taste is most refined, and his remarks on oratory, poetry, &c., are original and true, well rewarding the student.

LONGITUDE and **LATITUDE**. These terms mean different things as applied to a point of the earth or a star in the heavens; and we must accordingly distinguish between *geographical* latitude and longitude and *celestial* latitude and longitude.

The latitude of a star in the heavens is its angular distance from the ecliptic, measured on a great circle drawn through the star and pole of the ecliptic. It differs from the declination only in this, that the ecliptic is used instead of the equator. The longitude of a star is the angle made by the circle on which latitude is measured with the circle which passes through the pole of the ecliptic and the vernal intersection of the equator and ecliptic. Thus a star on the ecliptic has no latitude, and one which lies directly between a pole of the ecliptic and the vernal equinox has no longitude. The use of celestial longitudes and latitudes has in great measure been superseded by those of right ascensions and declinations. See RIGHT ASCENSION.

The meaning of the term geographical longitude is the same whether we consider the earth as a sphere or a spheroid. It is the angle contained between the plane of the meridian of the place and that of some one meridian which is fixed on as the starting-place. Thus, we chose the Observatory of Greenwich, and the French that of Paris, as being in the first meridian; and while we express the relative position of the two observatories (in longitude) by saying that Paris is 2° 20' 24" east of Greenwich, the French describe Greenwich as 2° 20' 24" west of Paris.

It is usual to measure terrestrial longitudes in time, the whole circuit of the globe being supposed described (as in the diurnal motion) in twenty-four hours. It is also usual to reckon longitudes to 180° east or west, without proceeding further. Thus a motion in longitude of 185° east will bring the traveller into 175° of west longitude. In astronomical writings, however, longitudes (both geographical and celestial) are measured all round the globe.

Supposing the earth to be a sphere, which is very near the truth, the latitude of a place is the angle subtended at the centre by the arc of the meridian intercepted between the place and the equator. This angle is equal to the altitude of the pole of the heavens at the place; and the determination of the altitude of the pole is the method usually resorted to in common practice for determining the latitude.

The determination of the longitude requires simply accurate instruments for the measurement of the positions of the heavenly bodies, and one or other of the two following—either perfectly correct watches or perfectly accurate tables of the lunar motions. The legislature of Queen Anne, which passed an Act offering a reward for the discovery of the longitude, the problem being then very inaccurately

solved for want of one or the other (good watches or lunar tables) never contemplated the invention of a method, but only of the means of making existing methods sufficiently accurate; and the legislature of George III., which repealed the former Act and substituted another, specifically limited the reward to those who should either proceed by improvement of chronometers or of lunar tables. Rewards were given to Harrison for the former, and to Mayer for the latter.

It is impossible to find the latitude of a place without knowing the position of the equator in the heavens, or the longitude without knowing the meridian of Greenwich. The equator has a real existence in the heavens, since its pole is the immovable point of the heavens, which can be detected (though it is not absolutely occupied by a star) from observation of the motion of the stars, which always preserve their distance from the pole. [See POLAR STAR.] But the meridian of Greenwich, a purely arbitrary circle of the earth, determined merely by the will of Charles II. that an observatory should be built on a certain hill near London, has no representative in the heavens. The only method, then, of finding longitude from the heavenly bodies is by finding the hour of the day which it is at Greenwich, at a particular hour on the spot whose longitude is required. It is then known how much of 360 degrees is revolved through by the earth in the period which brings a star from the meridian of the place upon the meridian of Greenwich, or *vice versa*; and this angle is the longitude. A watch which goes correctly and is set at Greenwich will carry the time at that place all over the world; or a celestial phenomenon, of which the Greenwich time may be predicted, will, if the moment of its happening be observed at any other place, give the difference of times at the moment of observation.

LONG LAND, author of the "Vision of Piers Plowman." See **LANGLAND**.

LONG MYND GROUP OF ROCKS are among the lowest of the Cambrian beds in the British Isles; they are grouped along with the *Harlech beds*, but contain few fossil remains. These rocks are exposed at the Longmynd in Shropshire, where they are highly inclined, and about 25,000 feet thick, though the base is not visible, being concealed by the overlying Upper Silurian.

LONGBARDS. See **LOMBARDS**.

LONG-TAILED DUCK (*Harleia glacialis*) is a species of sea-ducks, or **FULIGINÆ**. The genus *Harleia* is distinguished by having the bill very short, high at the base, not broad and arched; laminae prominent, trenchant, and distant; the upper laminae projecting below the margin of the mandible, the lower laminae divided into a nearly equal double series; the nostrils oblong, large, and nearly basal; the forehead high; the neck rather thick; the toes short. The tail is very long, of fourteen feathers, and the two middle tail-feathers in the male extend several inches beyond the rest.

The long-tailed duck is abundant in the Arctic Sea, remaining in the north as long as it can find open water, and assembling in very large flocks before migrating. It hibernates during its progress southwards, both on the shores of Hudson Bay and in the inland lakes, and is one of the last of birds of passage which quits the far countries. The species is abundant in Greenland, Lapland, Russia, and Kamchatka, and flocks pass the winter (from October to April) at the Orkney Islands. They are seldom seen in the southern parts of England, unless the weather be very severe. In October they visit the United States, and abound in Chesapeake Bay.

The summer plumage of the male is very beautiful, the neck and breast being chocolate-brown, back and wing-coverts brownish-black, and the head bluish. Its length to the end of the tail is about 23 inches. The long-tailed duck is a timid and shy bird. It flies and dives with equal facility. The flesh is tough and fishy.

LOO, VAN. See **VAN LOO**.

LOO-CHOO, LIEOU-KIEOU, or LEEU-CHEW ISLANDS, a group of islands between Japan and the Chinese island of Formosa. They lie between 21° 10' and 28° 40' N. lat., and 127° and 129° E. lon. The estimated area of the whole group is about 1000 square miles, and the highest estimate of the population is 100,000. The largest of them, called Great Loo-choo, is about 65 miles by 12, and contains the capital, Shuey, and the port of Nopokiang, which is open to foreign trade. The surface of the islands is mostly uneven and rugged, but the elevations do not attain a great height, Mount Onnodake, rising 1088 feet, being the highest peak in the ranges that run through them, trending in a north-east direction. They seem to be of volcanic origin. The lower tracts are of great fertility, but the most elevated are generally bare and rarely covered with wood. The fertile tracts are in high cultivation, and the produce very varied. Hogs, goats, and poultry, with rice and other vegetables, form the food of the inhabitants. These are rather low in stature, but are well formed, and have an easy graceful carriage; their colour is generally of a deep copper. Their language is similar to the Japanese. They seem to have made considerable progress in several branches of manufacturing industry, and prepare salt from sea-water in an ingenious manner. Sugar forms the chief export; and grass-cloth is the common stuff for garments, though common fabrics are abundant, the materials being grown in the islands. Among the imports tea and silk are the staple articles, but some of inferior kinds are of home produce. Two kinds of millet, sweet potatoes, and rice are the usual crops; besides which, the country affords all the common garden vegetables, melons, and many sorts of fruit. Seaweed is collected for manure, and agriculture is conducted on the same principles as in China, by hand-labour and irrigation. The inhabitants manufacture cloth, paper, lacquered wares, tobacco pipes, and a liquor called *saki*. Loo-choo, together with the whole of the islands scattered between the twentieth and thirtieth degrees of latitude, numbering more than 300, were annexed by the Japanese in 1879; the king was politely removed to the capital of Japan, where he was invested with the rank of a Japanese prince with a suitable income. His place at Shuey was filled by a governor, who has jurisdiction over all the islands. Their religion is a mixture of the doctrines and practices of Confucius with those of Buddha. A Christian mission was established by Dr. Bettleheim, a German physician, in 1851.

LOOE, EAST and WEST, two decayed towns of England, in the county of Cornwall, 267 miles from London, and 14 miles S.W. of Plymouth.

EAST LOOE is situated on the east bank of the river Looe, which here falls into the sea, on the south-eastern coast. It is built on a flat piece of ground between the river Looe and the sea, and consists chiefly of a labyrinth of narrow streets. A guildhall was opened in 1877. East Looe is united with West Looe, on the opposite side of the river, by a narrow bridge of thirteen arches. The inhabitants are chiefly engaged in the pilchard fishery, and an inconsiderable coasting trade is still carried on. The harbour admits vessels of 100 tons.

WEST LOOE is separated from East Looe by the river Looe. It was formerly a parliamentary borough, but was disfranchised by the Reform Act of 1832. In the reign of Edward III. East and West Looe were, next to Fowey, the chief ports in Cornwall, and sent twenty ships to the siege of Calais.

LOOM. See **WEAVING**.

LOOPERS is the name given to a group of **MORPHS**, **Geometridæ**, from the remarkable mode of progression adopted by their larvæ. The larvæ having legs only at either extremity of the body, the true thoracic legs, one pair of prolegs, and the claspers, advance by nearly their whole

length at each step, looping their body in the form of the Greek letter Ω . When the caterpillar is about to walk it attaches itself to the stem or leaf on which it is resting by its prolegs and claspers, and stretches its body to its full length; then takes hold by the six true legs, and draws the prolegs close up to them; it then again attaches itself firmly by its prolegs, stretches out the body and repeats the looping process. This peculiar mode of progression fully justifies their title of Geometridæ or Land-measurers. In addition these caterpillars often attach themselves by their hind legs and stretch their bodies out quite straight, remaining motionless in this attitude for hours. The most of this family have usually slender bodies with ample wings, which are often brightly coloured; in some few species the females are quite or nearly destitute of wings.

The family Geometridæ is usually broken up by entomologists into a number of separate families. The restricted family Geometridæ contains the Emerald Moths, so named from the beautiful emerald green colour of their wings. The Large Emerald Moth (*Geometra papilionaria*), found in English woods, has also its thorax and abdomen emerald green, marked with two transverse wavy whitish lines. The Swallow-tail Moth (*Urapteryx sambucaria*), another English looper, is placed in the family Urapterygidae. Among other English loopers are the Brimstone Moth, the Wave Moths (Acidalidae), the Heath Moths (Idoniidae), the Magpie Moth (*Abraxas grossularia*), whose caterpillar is very destructive to currants and gooseberries, the Carpet Moths (Larentiæ), and the Pug Moths (Eupitheciæ).

LOPE FELIX DE VEGA CARPIO (*Lope de Vega*) was born at Madrid, 25th November, 1562. The son of a poet, he himself manifested extraordinary poetic facility at a very early age. His father died when he was a mere boy, and he was sent to school by his uncle, an Inquisitor, who intended to train him for the church. He had written several poems and four dramas before he was thirteen years old. Soon afterwards he ran away from school in order to see the world; but was overtaken at a short distance from Madrid when trying to sell a stolen chain. His uncle having cooled considerably towards him, young Lope, by means of several pastorals, and a comedy in three acts, called "La Pastoral de Jacinto," ingratiated himself with the Bishop of Avila, through whose liberality he was enabled to enter the University of Alcalá, where he remained four years. He next became attached to the Duke of Alva, at whose request he wrote his "Arcadia," which, though written perhaps as early as 1580, was not published till 1598. He had previously married a lady of rank, Doña Isabel de Urbino. He continued to cultivate poetry with increased enthusiasm, until, having wounded a gentleman of rank in a duel, he fled to Valencia, and it was some years before he ventured to return to his family. Soon after this his wife, to whom he was tenderly attached, died; and to escape from painful recollections Lope became a soldier, and joined the "invincible Armada." During this unfortunate voyage he composed his "Hermosura de Angélica." He now quitted the career of arms and became the secretary of the Marquis of Malpica, and afterwards of the Count of Lemos, with whom he remained until his second marriage, to Doña Juana de Guadalupe, a lady of Madrid. He then determined to depend altogether on literature for a livelihood. This was perhaps the most fortunate period of his life. He had, by his own statement, already written no less than 900 dramas for the stage, besides twelve volumes of other poetry; he wrote so much, and had so many presents conferred upon him, that he was enabled to live in affluence. At this very time the immortal Cervantes, with Don Quixote in his brain, was starving in his wretched lodging in the same street. But Lope's spirit seems to have sunk under the loss of his second wife and a son whom he dearly loved, and he resolved to soothe it by the exercise of devotion. Perhaps there is

the less merit in this, as his previous life had worn out every form of vice and adventure. Accordingly he became a priest, and in 1609 a sort of honorary member of the brotherhood of St. Francis. Meanwhile he seldom passed a year without giving some poem to the press; and scarcely a month, or even a week, without producing some play upon the stage. In a very short space of time "Los Triunfos de la Fé," "Las Fortunas de Diana," three novels in prose, "La Círcé," a heroic poem, and "Philomena," were the fruit of his prolific pen.

His "Soliloquies of God," though printed under a feigned name, secured him as many admirers as his former productions. His "Corona Trágica" he dedicated to Pope Urban VIII., who conferred on him the degree of doctor of theology. He was at that time regarded with unbounded admiration both at home and abroad. He continued to publish plays and poems till the year of his death, when his health began to decline, and he expired 26th August, 1635, as the result of excessive scourging in a self-inflicted penance.

In addition to the works mentioned above he wrote several epic poems, as "La Jerusalem Conquistada," "La Círcé," "La Dragontea" (on the death of Sir Francis Drake), "La Andromeda," numerous pastorals, "Los Pastores de Belen," "La Dorothea," &c.; a burlesque poem, entitled "La Grammatica," several epistles, and other short poems, which were collected and printed at Madrid (1776-79, twenty-one vols. 4to).

Lord Holland has given, after Huerta, a list of all the dramas attributed to Lope de Vega which exist in print. There are 496 plays and twenty-one "Autos-Sacramentales," in all 518, to which number may be added many which have been lost, and many more which, though acted on the stage, were never printed, besides those which are preserved in manuscript. It has been stated that no less than 1800 of his plays were acted on the stage. Many of his novels were written in the absurd fashion called *lenguaje gramatical*; that is, distinguished by the omission through out of one particular letter of the alphabet. Five of such novels of Lope's are still extant, and many more are known to have existed. There is in addition, consisting of twenty-five volumes in 4to, published in parts between 1609 and 1647 at Madrid and other places in Spain, which is of excessive rarity.

LOPHIOMYS is a remarkable genus of RODENTIA forming the family Lophomyidae. This genus contains only a single species, *Lophiomya mahuasi*, which inhabits North-east Africa. This curious little rodent is arboreal in its habits, and presents much resemblance to an opossum, while some points in its anatomy find their parallel only among the reptiles. The lophiomyis has a small head, stout body, and short legs. The hind limbs are a little longer than the fore pair, and the first toe (hallux) on the hind feet is opposable to the other toes, so that the hind feet have a prehensile power which is very useful in climbing. The hair which clothes the body is very peculiar in structure, and forms an erectile crest along the back and tail; the hairs forming the crest are dark in the middle, but white at the base and tip; while the hairs on the flanks are of a grayish-tawny colour. In the general features of its skeleton the lophiomyis approaches the mice (Muridæ) most nearly, but the clavicles are quite rudimentary, as in the hares (Leporidae). There are three molars on each side in each jaw, which are rooted and strongly tuberculate; there are no premolars; two incisor teeth of the typical rodent character are present. The skull, while like that of a mouse generally, presents some remarkable features. The temporal fossæ are completely arched over by thin plates arising from the temporal ridges and malar bones, and the whole of the upper surface of the skull is covered with minute granules, which are regularly arranged. This remarkable animal was first described by Milne Edwards,

from a specimen which was brought to France, and lived in captivity in the Jardin d'Acclimatation.

LOPHOBRANCHII is an order of bony fishes in which the gills, instead of being pectinated, are separated into small rounded tufts, which are arranged in pairs along the branchial arches, and covered by a large operculum, so fixed as to leave only a single small orifice for the passage of the water outwards.

The skeleton is only partially bony, and the muscles are not much developed. The jaws are united and tubular, and have no teeth. The body is covered with plates united at their edges. The air-bladder is without an air-duct. The fins are generally imperfectly developed. This order only contains two families, Solenostomidae, with the single genus *SOLENOSTOMA*, and Syngnathidae, containing the PIPE-FISHES and SEA-HORSES.

LOPHOTES is a genus of bony fishes placed by Günther in a separate division of the ACANTHOPTERYGII, under the name Lophotiformes, which includes only a single species, *Lophotes cepedianus*. This remarkable and scarce fish has only been found (in deep water) in the Mediterranean, off Madeira, and in the Sea of Japan. The body is sometimes more than 5 feet long, ribbon-shaped, scaleless, and silvery white. The head is elevated into a very high crest. The vent is placed near the extremity, and is followed by a short anal fin. The dorsal fin commences on the head with a very long and strong spine, and runs the whole length of the back. The fins are rose-coloured.

LO'QUAT, or Japanese Medlar, is an edible fruit, the produce of a tree (*Eriobotrya japonica*) nearly related to our medlar. It is a native of China and Japan, the word *loquat* being the Chinese name for it. The first botanist who gave an account of it was Kamper. He found it growing in Japan in 1690. Its first introduction into England was in the year 1781. It grows well in the south of England, but rarely ripens its fruit except under glass. In the south of France, however, it is cultivated for its fruit in the open air. The fruit is about the size of a small apple, and is of a pale orange with a tinge of red; the flesh is pale yellow with a somewhat acid taste. The tree is allied to the apple, and belongs to the group Pomace, of the order Rosaceæ.

LORANTHACEÆ is an order of plants remarkable for their parasitism. The mistletoe belongs to the order, and affords a good example of the parasitic habit of the order; it is the only British representative. Loranthus is a very large genus. One species, *Loranthus europæus*, occurs in the south of Europe; but in the hot dry parts of tropical countries the species abound, swarming over the branches of trees, of which they often form a conspicuous feature, with their long-clustered gaily coloured flowers. As a parasite the mistletoe does not injure, in any considerable degree, the plant which it attacks, unless it exists in unusual quantity, as in India, where Loranthi are common, the injury sustained by vegetation is according to the reported size of the parasite and its stock.

The order belongs to the series Achlamydosporæ among the MOSCOHAMYDACEÆ, which series is characterized by the ovary being one-celled, one to three ovules in the cell, the ovule being generally reduced to a naked nucleus. The perianth has four to eight lobes with the same number of stamens, each attached to and opposite each lobe. The ovary is inferior, and the fruit succulent, containing a single seed. According to Van Tieghem, the sepal and stamen and carpel and ovule, are deduplications, each of a single leaf.

LORD, a title given in Great Britain to parts of the realm and the archbishops and bishops who have the right to sit in the House of Lords, as the Lords Spiritual and Temporal. By courtesy the title is also given to the eldest sons of dukes, marquises, and earls, prefixed to an inferior title of the peerage, and to the younger sons of dukes and

marquises, prefixed to their Christian name and surname. The title is also bestowed on the following official personages by virtue of their offices—the Lord Lieutenant of Ireland and lords lieutenant of counties; the Lord Chancellor, Lord Privy Seal, Lords of the Treasury and Admiralty, the Lord High Admiral, Lord Great Chamberlain, Lord Chamberlain, Lord High Constable, Lord High Almoner, Lord High Steward, Lords in Waiting, Lords of the Bedchamber, Lords Justices, Lord Chief-justice, Lord Lyon, the Lord Mayors of London, York, and Dublin, and the Lord Provosts of Edinburgh, Glasgow, and Perth. The representative of the sovereign in the General Assembly of the Church of Scotland is called the Lord High Commissioner. All the judges of Great Britain and Ireland are addressed as "my lord," when presiding in court. The word is from the Old English words *hlaf* and *ward*—*hlaf-ward*, loaf-keeper.

LORD ADVOCATE. See ADVOCATE, LORD.

LORD LIEUTENANT OF A COUNTY. It was formerly usual for the crown to issue commissions of array, requiring certain experienced persons to muster and set in military order the inhabitants of the counties to which the commissioners were sent. In the sixteenth century these commissions gave place to commissions of lieutenancy, by which nearly the same powers were conferred on certain persons as standing representatives of the crown. The right of the crown to issue commissions of lieutenancy was denied by the Long Parliament, and formed a proximate cause of the rupture between Charles I. and his subjects. At the Restoration the right of the sovereign to issue such commissions was established by a declaratory Act, 11 Charles II. c. 3.

The lord lieutenant is the local representative of the crown and the head of the magistracy, and is considered responsible in cases of emergency for the preservation of the peace. He was formerly also head of the militia and yeomanry, but his power as to the appointment of officers in these forces was abolished by the Army Regulation Act of 1871. The lord lieutenant nominates to the lord chancellor all the justices of the peace for his county.

LORD LIEUTENANT OF IRELAND. From a very early period the government of Ireland has been committed to a viceroy or representative of the English sovereign, generally known as the lord lieutenant, to whom very extensive powers have been intrusted. In the earliest times these powers were of an almost regal character, but at the present day the lord lieutenant is appointed by the government in power, and is expected to carry out the policy of the cabinet for the time being, the office becoming vacant on a change of administration. When he is not himself a member of the cabinet, its decisions and opinions on all important matters are communicated to him through the home secretary, with whom it is his duty to maintain a close and constant correspondence. In the government of Ireland he is assisted by a privy council, and he holds a viceregal court at Dublin Castle, to maintain the dignity of which he is allowed a salary of £20,000 a year. He is commissioned to maintain order in Ireland, and to see that justice is properly administered, the control of the police being committed to him, and the commander-in-chief of the troops in Ireland being placed under his orders. The lord lieutenant may confer the honour of knighthood, and his advice and recommendation are sought by the crown in the appointment of judges, law officers, and privy counsellors, and in the granting of military commissions.

LORD OF MISRULE, the *Master of the Revels*. "First in the feast of Christmas," says Stowe ("Survey of London," edition, 1603, p. 98), "there was in the king's house, wheresoever he was lodged, a lord of misrule, or master of merry sports, and the like had ye in the house of every nobleman of honour or good worship, were he spiritual or temporal: among the which the mayor of London, and either of the sheriffs, had their several lords of

misrule, ever contending, without quarrel or offence, who should make the rarest pastimes to delight the beholders. These lords, beginning their rule on Allhallow Eve, continued the same till the morrow after the Feast of the Purification, commonly called Candlemas Day."

LORD'S-DAY, the first day of the week, observed by Christians in commemoration of the Saviour's resurrection, and in contradistinction to the Jewish Sabbath, or seventh day of the week, which the Mosaic law appointed for total cessation from labour. The characteristics of the Jewish Sabbath are, however, blended by many sects of believers with the features of the Lord's-day, especially by the Scotch Presbyterians, and this rigid observance of religious duties has given rise to much wearisome and unprofitable discussion; the more latitudinarian worshippers stigmatizing their opponents as Sabbatarians, and the latter condemning the former as heterodox and profane.

It is clear from historical evidence that the Lord's-day was not recognized as the Sabbath by the early Christians. In the days of the apostles it would seem that the faithful met on the evening of Saturday for the Lord's Supper. Gradually the disorders which crept in at Corinth and elsewhere made a change needful. Men were enjoined to take their repast at home, so as not to profane the sacrament with the voracity of hunger. Thus by degrees passing, as at Tions, through a midnight service (Acts xx. 7), the Supper of the Lord crept on from what we should call the evening of the seventh day to the early morning of the first, and so ceased to be a supper in reality.

• It is now, says Professor Plumtree, that we meet with the special adjective coined by St. Paul for the Lord's Supper (Gr. *kuriakos*) applied to the day, probably by St. John in the Apocalypse (Rev. i. 10), and certainly in the writings of Tertullian and others. By a singular train of consequences, that which had originally received its holiness from one day now imparted a sanctity and a consecration to another. Henceforth the Lord's-day was universally recognized in the Christian world as a day of joy and gladness—a day of rest, where rest was possible—for deeds of charity and Christian kindness, for devotional occupations, and for participation in that peculiar act of worship which gave the day its name. How the Lord's day of the Christian Church was transformed into the Sabbath of the Reformers, is considered in the article **SABBATH**.

LORDS, HOUSE OF. See **PARLIAMENT**.

LORDS JUSTICES. See **JUSTICES, LORDS**.

LORD'S SUPPER. See **COMMUNION**.

LORENZO DE MEDICI. See **MEDICI**.

LORETTO or **LORETO**, a town of Italy, in the Marches, 13 miles S. by E. of Ancona, is situated on the Muscone, near its mouth in the Adriatic. It is chiefly famous for its sanctuary of the Madonna, called the Santa Casa, or Holy House, which is said to be the house in which the Virgin Mary lived at Nazareth, and to have been miraculously carried, first to a hill near Fiume in Dalmatia, and finally, in 1294, to its present site, near the Adriatic coast. The ground on which the house was deposited belonged to a woman called Lauretta, whence the name of Loretto. The town which has grown up around the sanctuary is well built, and in 1881 contained 8000 inhabitants. The celebrated Holy House stands within a magnificent church. It is a small brick house, with one door and one window, originally of rude material and construction, but now, from the devotion of pilgrims for many generations, a marvel of art and costliness. It is entirely cased with white marble exquisitely sculptured.

L'ORIENT, a seaport at the confluence of the Scioff and the Blavet, in the French department of Morbihan, is situated 267 miles west by south from Paris, and had 31,218 inhabitants in 1881.

The town is of modern origin. It owes its importance to its having been made the naval depot of the French

East India Company in 1666, from whence the place took its title of Port de l'Orient ("Port of the East.") At the dissolution of the company in 1720, it was made one of the stations for the French navy and a free commercial port. It is fortified; the houses are well-built; the streets wide, clean, and well-paved, and there are several pleasant promenades. The port is on the east side of the town, from which it is walled off; its length is nearly 4000 feet, and its breadth nearly 2000 feet. The dockyard is one of the finest in the kingdom, and there are large slips. The harbour is bordered by fine quays, on which are large buildings connected with the dockyard, and an observatory. There is a signal tower, 123 feet high, built on an eminence south of the harbour, from which vessels can be discerned 30 miles out at sea. It has manufactures of hats, linens, braid, gold lace, and pottery; the exports consist of corn, wine, brandy, iron, lead, cotton and woollen stuffs, hardware, &c., cattle, and manufactured goods. The sardine and pilchard fishery is actively carried on.

L'Orient is the seat of a maritime prefect; it has also a chamber of commerce, an exchange, national and communal college, town-hall, theatre, and a public library.

In the channel is the Ile St. Michel, covered with the yellow buildings of the Lazaret, and beyond it, on a projecting point, the fortress of Port Louis, commanding the entrance of the harbour, heavily armed. Napoleon III. was shut up in it after the attempted rising at Strassburg. The estuary of the Scioff is crossed by a beautiful iron bridge, 360 yards long, on leaving L'Orient.

LORIMER (bridle-cutler, from Lat. *lorum*, a thong) is the name given to the persons employed in those trades which supply the metal fittings for saddles and harness generally. They have a guild in London (the Lorimers' or Loriners' Company), and in the Scotch burghs are comprehended as a branch of the corporation of hammermen. In the latter country, however, the term is also applied to cutlers, locksmiths, and brassfounders.

LO' RIS, or Slow Lemur, are the names given to a group of **LEMURIDEA**, forming a subfamily **Lorisinae**, of the family **Lamniidae**, for some authors, and a distinct family, **Nyctelodidae**, for others.

The Slow Lemurs are strictly nocturnal and arboreal in their habits. The fore and hind limbs are nearly equal in length; the index finger is very short and sometimes rudimentary, and the first digit on each limb (pollex and hallux) is widely divergent from the other digits. The tail is short or quite rudimentary. The head is round, the ears short, and the eyes very large. In the number and arrangement of their teeth they agree with the true Lemurs (**Lemurinae**). The mammae are two in number, situated on the breast. The loris is remarkable for having an arterial plexus, called a *rete mirabile*, which is also found in the sloths; the bloodvessels supplying the limbs breaking up into a closely-packed set of small parallel branches. These lemurs inhabit Africa and Asia, but are not found in Madagascar.

The Slender Loris (*Loris* or *Stenops gracilis*) is found in some parts of India and Ceylon. This lemur measures about a foot in length, and is of a grayish-fulvous colour, with the lower surface of the body whitish, and a white band running down between the eyes, and surrounding the nose. It has a rounded head, with small ears and a short pointed nose. Its body and limbs are slender, and the tail is altogether wanting. Its fur is very thick and soft. The habits of the loris are strictly nocturnal. It resides in large forests, usually in mountainous districts, and passes the days sleeping in the holes of trees. At sunset it comes forth, and moves slowly about among the branches, seeking its food, which consists partly of fruits and the tender leaves of trees, and partly of insects, small birds, and mice. When on the ground its long slender limbs seem unable to support it, and it moves in a manner somewhat

resembling that of a very young puppy. Another species (*Nyctichus tardigradus*) replaces the slender loris in some parts of India and Ceylon, and extends its range into Burma, Siam, Cochín-China, Sumatra, Java, Borneo, and the Malay Archipelago. It is a smaller animal, with the body and limbs somewhat stouter, but in other respects resembles the preceding species closely. The *Nycticebus* of Java, and that of Siam and Cochín-China, are sometimes considered distinct species. The African kinds are the Porro (*Perodicticus potto*), which has the index finger reduced to a nailless tubercle, and the Angwantibo (*Perodicticus* or *Arctocebus calabarensis*).

LORRAINE (in German *Lothringen*), a large province of France, from which the departments of Vosges, Meurthe, Moselle, and Meuse were constituted. After having formed part of Gallia Belgica under the Romans, and of Austrasia under the successors of Clovis, the territory of Lorraine was united to the empire of Charlemagne. It was afterwards erected into a duchy, and in course of time passed to the house of Austria. By the treaty of Vienna, concluded 18th November, 1736, Francis Stephen, duke of Lorraine and husband of Maria Theresa, exchanged for the duchy of Tuscany the duchies of Lorraine and Bar, which were ceded to Stanislas Leezinski, the father-in-law of Louis XV., during his life. Stanislas having died on the 3rd of February, 1766, the two duchies were reunited to France. At the termination of the Franco-German War, in 1871, a large portion, consisting of the department of the Moselle—including the city and fortress of Metz—and part of that of the Meurthe, the whole having a population of 360,000, was ceded to Germany. See ALSACE-LORRAINE.

LORRAINE, CLAUDE. See CLAUDI.

LORY is the name given to certain birds belonging to the order PSITTACI, which inhabit the Moluccas, New Guinea, and many of the islands of the Malay Archipelago. Most of the birds to which this title is applied have been placed in the family Trichoglossidae or Brush-tongued Parrots, which are distinguished by having the tongue not thick and fleshy but slender, and furnished with elongated papillae, the latter sometimes forming a brush at its extremity. The birds feed not upon hard nuts and seeds, but partly on pulpy fruits and partly on the sweet juices of flowers. In accordance with these habits the bill is weaker and more slender than in other parrots, the lower mandible being weak and with smooth cutting edges, and the prominences on the palate which assist in comminuting the food in other groups being absent.

The Purple-capped Lory (*Lorius domicella*) is a native of the Moluccas and some islands of the Malay Archipelago. This is about 11 inches long, and is of a bright scarlet, with the wings green, the shoulders and legs blue, and the crown of the head blue-black. A broad yellow band more or less tinged with red crosses the upper part of the breast, and the feathers of the short rounded tail are tipped with yellow, within which there is a blackish band. The bill is orange yellow. This bird is highly esteemed as a cage bird, not only on account of the beauty of its plumage, but also for its docility and liveliness, and the distinctness with which it learns to utter words and even sentences.

The Papuan Lory or Lorikeet (*Charmodora papuensis*), one of the most beautiful of these birds, and indeed of the whole family of parrots, is also of a scarlet colour, but richly variegated with azure-blue, yellow, and green. The crown of the head bears two blue spots, and the whole lower part of the back and the legs are also blue. Each side exhibits two spots of rich yellow, and the wings are green. The tail is long and graduated, and the two centre feathers are much longer than any of the rest; in fact, these feathers alone measure 11 or 12 inches in length, while the actual body of the bird is only 6 inches long. The tail-feathers are all green at the base and yellow at the extremity. This most beautiful species is a native of New Guinea.

Mr. A. H. Garrod (*Proceed. Zool. Soc.* 1874, pp. 586-98) abolishes the family title Trichoglossidae, considering the brush-tongue as not of great classificatory importance, and places all the birds to which the name Lory has been applied in the subfamily Palaeornithinae, characterized by the absence of the ambiens muscle and the presence of the two carotid arteries, furcula ("merrythought"), and oil-gland. This subfamily includes the following genera, which are known as lorics and lorikeets, *Lorius*, *Electus*, *Eos*, *Loriculus*, and *Trichoglossus*, as well as *Palaeornis*, the Ring Parrakeets, and other genera.

The Lory or Louri of South Africa is a TORRACO (*Corythaix*).

LOT, a department in France, formed of part of the old province of Guienne, between the departments of Gironde, Dordogne, Lot-et-Garonne, Tarn-et-Garonne, Aveyron, and Cantal. Its greatest length from north-east to south-west is 52 miles, and its average breadth is 31 miles. The area is 2012 square miles, and the population in 1881 was 280,269.

Hydrography.—The department takes its name from the Lot (ancient *Oltis*), which, rising in the mountains of Lozère, flows in a general western direction across the departments of Lozère, Aveyron, Lot, and Lot-et-Garonne, where it enters the Garonne on the right bank, a little above Aiguillon, after a course of 270 miles, 187 of which, from Entragues, where it is joined by the Truyère, in the department of Aveyron, are navigable. The north of the department is drained by the DORDOGNE. The watershed between these two rivers is formed by a prolongation of the Auvergne Mountains, which traverse the department from north-east to west, dividing it into two slopes, the northern one belonging to the basin of the Dordogne, the southern one to the basin of the Garonne. The Selle, which flows along the south-eastern side of this mountain range, and enters the Lot on the right bank near St. Cirq, is the only other river of importance. Some small feeders of the Garonne rise in the south of the department, the largest of which is the Barguelonne. The eastern districts of the department are covered with low hills, which are ramifications of the Cévennes.

Soil and Products.—The deep soils of the valleys and plains yield fine crops of wheat, maize, barley, and oats; on the lighter soils, rye, rape, and buckwheat are grown; and on the strongest soils considerable quantities of hemp and tobacco are raised. The hill-slopes along the rivers are generally laid out in vineyards, which yield annually 13,200,000 gallons of wine, the best kinds being those of Calers and Grand-Constant. About two-thirds of the whole produced is exported or distilled into brandy. The white mulberry is extensively cultivated for the production of silk. Excellent truffles are found. Plums are grown in large quantities, and, when dried, form an important article of export. Turkeys, geese, game, and poultry generally, are very plentiful. Horses, cows, and sheep are of inferior breeds; goats are numerous; and large numbers of pigs are fattened for the supply of the neighbouring departments. Wild boars are now rarely met with. Hares and rabbits are very numerous, and of large size. Fish is abundant in all the rivers, among which the Cère, a feeder of the Dordogne, is famous for eels, and the Lot for carp of enormous size. Some iron and coal mines are worked; lead, calamine, marble, millstone-grit, granite, limestone, potter's and fuller's earth, &c., are found. The manufactures of the department are unimportant; there are a few iron forges, potteries, and paper-mills, and numerous corn and flax mills.

Climate.—The department presents great differences of temperature and climate. Among the granitic highlands of the east the winters are long and rude, generally lasting from November to April, during which time snow and rain, each accompanied by cold winds, alternately succeed each other. The calcareous slopes of the Auvergne range have

a drier and less rigorous climate, and a much shorter winter. In the plains and valleys of Dordogne and the Lot the climate is genial, except during the spring, when the night frosts are often very harsh and biting.

The department is divided into the three arrondissements—Cahors, Figeac, and Gourdon. Of the arrondissement of Cahors, and of the whole department, CAHORS is the capital.

LOT-ET-GARONNE, a department in France, comprising the former district of Agénois, part of the diocese of Condom, and portions of those of Bazas, Lectoure, and Cahors, takes its name from the Lot and the Garonne, which traverse it, the former from N.E. to W., the latter from S.E. to N.W., and is bounded N. by the department of Dordogne, E. by those of Lot and Tarn-et-Garonne, S. by that of Gers, and W. by those of Landes and Gironde. Its greatest length from north-east to south-west is 63 miles; from south-east to north-west, 55 miles. The area is 2067 square miles, and the population in 1881 was 312,081.

Surface and Products.—The surface of the department presents a high plain, furrowed to different depths by river valleys, but diversified in the south by some low swells, the last declivities of the Pyrenees northwards; the whole inclining towards the north-west and belonging to the basin of the Garonne. Nothing can exceed the beauty and fertility of the valleys of the Lot and the Garonne; the slopes that inclose them are covered with vines and other fruit trees, especially the fig and the plum, and the low lands yield abundantly wheat, maize, rye, hemp, tobacco, &c. The valley of the Baïse, in the south, and that of the Dropt, in the north of the department, are also very fertile. With these exceptions the department presents an arid, treeless surface, with a barren stony soil, especially in the eastern districts at a little distance from the Lot and the Garonne. In the upper part of Agénois the soil is a stiff iron-coloured clay that ill repays the labour of the husbandman; and in the Landes, which extend over the south-west of the department along the Avenne, the ground is covered with arid sands, unhealthy marshes, and in some places with a scanty soil, which can with difficulty be made to produce a few ears of corn. In this last district there are also some hungry pastures and forests of pine and cork; the cork woods along the left bank of the Gélise, a feeder of the Losse, in the south of the department, are the largest in France. On the northern borders there are fine chestnut woods. The quantity of wine annually produced is 15,000,000 gallons, half of which is retained for home consumption; part of the surplus is distilled into brandy, and the remainder is exported to Bordeaux. Cattle, horses, mules, and sheep are reared in immense numbers, and geese form an important article of export. Game and fresh-water fish are plentiful. The climate of the department is in general very healthy; but long alternations of drought and rain are not uncommon. The principal rivers are the Lot, the Garonne, the Gers, and the Dropt.

Natural Products, &c.—Iron mines are worked; good building stone, calcareous spar, gypsum, and marl are found. The chief manufactures are cork (for which there is a national establishment), vinegar, sailcloth, linen, swanskin, pottery, linen and cotton yarn, gloves, calico, iron, glass, paper, lime, ropes, leather, and tobacco. The commerce is composed of the various industrial and agricultural articles enumerated, and of pitch and tar made from the pines of the Landes. The department is divided into the four arrondissements of Agon, Marmande, Villeneuve-d'Agen, and Nérac. The chief town is Agen.

LOTHAR or **LOTHAIR**, Emperor of the Holy Roman Empire, was the son of Louis le Débonnaire (or the Pious) and grandson of Charles the Great. He was born in 794; and in 817 was made his father's colleague in the empire, the whole territory being divided into govern-

ments between him and his two brothers. A younger brother (half-brother) being afterwards raised by the Emperor Louis to a similar position, caused Lothar and his two brothers to revolt, and thence did their unhappy father thus provoke and thence suffer from their jealousy. On Louis' death (in 840) Lothar became Emperor, after seven struggles with his brothers. His personal government extended across Europe, separating that of his Frank or French brother from that of his German brother. Lothar's territory embraced Italy, Burgundy, and the Rhine provinces and the Netherlands. Hence the name of a large part of the Rhine provinces, Lotharingia, Lothringen, or Lorraine. Constant trouble with his brothers and with the Northmen and Saracens wore out the emperor's spirit, and in 855 he abdicated, dying a few months after.

LOTHAR II. (the Saxon), Emperor, King of Germany, was the son of Gebhard, count of Arnsberg, and was born in 1075. In 1106 the Emperor Henry V. made him Duke of Saxony. After a life of incessant revolt against the emperor, Lothar succeeded him in the empire in 1127, by securing with the most lavish promises the support of the papal party, soon to be called *Guelfs*; the imperial party, in a few years to be known as *Ghibellines*, preferring Duke Frederick of Swabia, grandson of Henry IV. Lothar and the papalists prevailed, and he was crowned at Rome by Pope Innocent II. in 1133, receiving also in fief the great estates the Countess Matilda had left to the church. Lothar's homage for that territory was often afterwards sought to be twisted by the church into an acknowledgment of feudal superiority of the Pope over the emperor as emperor. The rest of the reign was chiefly spent in creating a new German power, that of the house of Welf (or, as it was Italianized, *Guelph*)—Henry of Welf, duke of Bavaria, surnamed *the Proud*, being the emperor's son-in-law, and being loaded with honours and riches by him. Another adherent, Albert the Bear, was rewarded with North Saxony, afterwards Brandenburg, and hence the foundations of the fortunes of the house of Prussia. The Danish king of England, the great Canute, was also one of those who received lands in fief from Lothar. In 1135 was held the great diet of Magdeburg, at which the first formal constitution of the Holy Roman (or German) Empire was settled in considerable detail. In 1136, Innocent II. being hard pressed by Roger of Sicily, Lothar went to his assistance. He succeeded in driving Roger back to Sicily, but was overtaken by death on his return journey homewards (1137).

LOTHIANS, a term under which that part of Scotland is comprehended which stretches along the southern shores of the Frith of Forth, and includes the three counties of Haddington, Edinburgh, and Linlithgow. The first of these counties is also called East Lothian, the second Mid Lothian, and the last West Lothian. The soil is usually fertile and repays cultivation. The Lothians were occupied by the Saxons in 450, and were not incorporated with the rest of Scotland until the close of the eleventh century.

LOTH RINGEN. See **LORRRAINE**.

LOTIONS, or Washes, are either mixtures of different ingredients, or solutions of various medicinal substances designed for external application only. Experience has shown that many agents, which would be poisonous if taken internally, may be used to advantage as external applications, and some of the lotions used in medicine contain such active ingredients that great care is necessary in using them. Among the more simple lotions are the *Arnica Lotion*, which may be easily made by adding 20 drops of the tincture to half a cupful of water, and which is a very useful application to bruises and swellings; *Hamamelis Lotion*, made by adding 3 drachms of the tincture to half a pint of water, one of the best remedies known for bleeding piles; *Sulphur Lotion*, used to remove

some affections of the skin, composed of flowers of sulphur, glycerine, and rose water, in the proportions of one tea-spoonful of the first and two table-spoonfuls of the second to half a pint of the last; and the *Alkaline Lotion*, which may be made by dissolving a teaspoonful of carbonate of soda in a pint of water, and which is useful for allaying the itching of nettle-rash and other skin diseases. Of the more powerful lotions of the Pharmacopœia, the most important are the *Hydrargyri flava* and *nigra*, or the *yellow* and *black wash*, made up of calomel and lime-water, which are frequently used as local applications to sores of a specific nature.

LOTTERY. The word lottery, derived from the Old English word *lot*, with the French-Latin termination *-ery* (as in *brewery*, *fishery*, &c.), signifies a game of hazard, in which small sums are ventured on the chance of obtaining more, and in which the prizes are drawn by lot. Such games were common in ancient Rome; and during the middle ages lotteries were utilized by the Italian merchants for the disposal of their goods. Some of the Italian states then adopted the lottery as a means of raising revenue, and the institution of state lotteries afterwards became very common and very popular throughout Europe.

The earliest English state lottery of which there is any record was in 1569, when 40,000 chances were sold at 10s. each. The prizes consisted of articles of plate, and the profit was employed for the repair of certain harbours. In the course of the following century the spirit of gambling appears to have materially increased in this direction, for *private* lotteries were early in the reign of Queen Anne suppressed "as public nuisances." Government lotteries, however, were still maintained, and from 1709 to 1824, considerable sums were annually raised in lotteries authorized by Act of Parliament. Usually the number of tickets in a lottery was 20,000, at a value of £10 each in prizes, which were sold at a premium varying from 10 to 60 per cent. to contractors. This premium formed the profit of the government, and the contractors, who undertook the sale of the tickets and the arrangement of the prizes and blanks, repaid themselves by a further advance of £4 or £5 on each ticket. The tickets were divided into halves, quarters, eighths, and sixteenths, to suit all classes of purchasers, and the public were invited to subscribe by means of advertisements, placards, hand bills, and the personal canvas of agents, known as "moucho men," from the red leather pocket-books they carried, who travelled throughout the country. The average yearly profit to the government, from 1793 to 1824, was over £310,000. On the ground of injury to public morals, lotteries of all kinds were abolished in England in 1826, a previous Act passed in 1823 having suppressed all private lotteries and declared the sale in this kingdom of all tickets, or shares of tickets, in any foreign lottery illegal. In Scotland the same statutory prohibitions apply to lotteries as in England; but in 1831 a private Act of Parliament (1 & 2 Will. IV. c. 8) was obtained apparently sanctioning the disposal of certain street property in Glasgow by way of lottery. The Act passed, it is understood, *per incuriam*; and by 4 & 5 Will. IV. c. 37 the Glasgow street lottery was brought to an end. Private lotteries may be dealt with as nuisances at common law—at least that is the general opinion, but the point has not been decided.

The system of state lotteries was early introduced into France, and it was carried out there to an extent which made it a source of greater demoralization than in England. Royal or state lotteries were suppressed in France in 1836, but lotteries in aid of charity or of the fine arts are still legal, and lottery loans are permitted in several of the great towns. Lotteries still form an important feature in the financial arrangements of Germany, Holland, Spain, Italy, and Austria.

The law which renders the sale of foreign lottery tickets

illegal is systematically evaded in England, and most of the German lotteries appeal through their agents on the Continent to British subscribers. Immense numbers of circulars, a large proportion of which relate to mere swindling adventures, are despatched by means of the post-office, and the tickets are subdivided into very small amounts. Experience has shown that from the encouragement they give to the pernicious spirit of gambling, lotteries, even when fairly conducted, are among the worst methods that can be adopted for adding to the revenue of a country. If the true nature of the lottery was generally understood comparatively few persons would be found willing to speculate, inasmuch as a successful lottery must of necessity be unprofitable to the investors. In some of the best of the continental schemes the odds against the players vary from 25 to 50 per cent., even without counting the chances on unsold tickets in favour of the bank; that is to say, that out of every £100 nominally subscribed only £50 to £75 are returned in prizes. There is always, however, one "grand prize," and the hope of securing this, and thus achieving fortune at a stroke, is probably the chief attraction to the greater number of the speculators. But in the worse forms of lottery the chances are far less favourable; in fact they are thinly disguised forms of swindling.

Lotteries were formerly very common in the United States, and they have received sanction there not so much as a means of raising money for state purposes, as with the view of encouraging, as was supposed, many useful objects which could only be effected by raising at once a large sum of money, such as canals, the establishment of schools, and even the publication of a book. As might be expected the schemes opened the way for the perpetration of numerous frauds, the exposure of which did perhaps more than anything else to open the eyes of the people to the mischief arising out of the system of the lottery. The 9 & 10 Vict. c. 48, legalizes art unions in this country. See ART UNIONS.

LOTUS is the name of various plants mentioned or described by ancient writers. The want of exactness and the mixture of legend in these notices have led to considerable doubt about the actual plants intended. In the Homeric story, which has given occasion to Tennyson's beautiful poem, "The Lotus Eaters," the lotus is the fruit of a tree, and sweet as honey. Theophrastus speaks of the tree as being as large as a pear-tree, with a leaf serrated like that of the *Quercus ilex*; the fruit resembling the Egyptian bean, produced thick and close on the shoots, like myrtle-berries. He adds that in one kind there is no stone, that it is sweeter, and wine is made of it. Pliny and other ancient writers confirm this general description, and it appears to fit some species of *Zizyphus* or *Jujube*. Mungo Park describes the natives in Africa as gathering "small farinaceous berries of a yellow colour and delicious taste, which were no other than the fruit of the *Ithamus* (*Zizyphus*) *lotus* of Linnaeus. They had gathered two large basketfuls in the course of the day. These berries are much esteemed by the natives, who convert them into a sort of bread by exposing them for some days in the sun, and afterwards pounding them gently in a wooden mortar until the farinaceous part of the berry is separated from the stone. This meal is then mixed with a little water, and formed into cakes, which, when dried in the sun, resemble in colour and flavour the sweetest gingerbread. The stones are afterwards put into a vessel of water and shaken about, so as to separate the meal which may still adhere to them; this communicates a sweet and agreeable taste to the water, and, with the addition of a little pounded millet, makes a pleasant gruel called *fondi*, which is the common breakfast in many parts of Ludamar during the months of February and March. The fruit is collected by spreading a cloth upon the ground, and beating the branches with a stick. The lotus is very common

in all the kingdoms which I visited, but is found in greatest plenty on the sandy soil of Kaarta Ludamar, and the northern parts of Bambarra, where it is one of the most common shrubs of the country. As this shrub is found in Tunis and also in the negro kingdoms, and as it furnishes the natives of the latter with a food resembling bread, and also with a sweet liquor which is much relished by them, there can be little doubt of its being the *lotos* mentioned by Pliny as the food of the Libyan Lotophagi."

Another candidate for the honour of representing the *lotus* is the plant called *Nitraria tridentata*; but though the fruits are eaten, they have a distinctly salt taste, and are therefore scarcely likely to have been described by Homer in such terms as:—

"Divine nectareous juice
(Thence called Lotophagi) which, whose tastes,
Insatiate riots in the sweet repasts,
Nor other home, nor other care intends,
But quits his house, his country, and his friends."
—*Pope*.

Another plant of different character was the sacred *lotus* of the Nile. This is described as springing up in Egypt in fields inundated by the river, with a stem like that of the *lunamos*, or Egyptian bean (*Nelumbium speciosum*), and a white lily-like flower, which rises out of the water at sunrise and sinks down again at its setting, a capsule like that of the poppy, in which are contained seeds which the Egyptians roast and make into bread, with a root which is likewise eaten, both in a dressed and an undressed state. The plant is no doubt *Nymphaea lotus*. A blue form of the sacred *lotus* is also mentioned, and this appears to be the fragrant *Nymphaea cerulea*, found in the Nile at the present day. Its form corresponds with those depicted on the ancient monuments, and it is significant that these are held as if they were sweet-smelling.

Another *lotus* is spoken of as being herbage, cropped, for instance, by Achilles' horses. It is not clear what plant was intended; it may have been species of the botanical genus *Lotus* or *Medicago*.

The Indian *lotus* is the same as the Egyptian bean. This is also figured on the monuments.

The genus *Lotus* of botanists belongs to the LEGUMINOSÆ. The species *Lotus corniculatus* is the bird's-foot trefoil. It has yellow flowers in an umbel and a cylindrical pod. It is common in our pastures.

LOTZE, RUDOLPH HERMANN, a distinguished German metaphysician and philosopher, was born in 1817 at Bautzen, in Saxony. He studied both medicine and philosophy in Leipzig, graduating in both in 1838, and becoming *Privat-Dozent* or university (private) lecturer in 1839. In 1842 he became extraordinary professor of philosophy. In 1844 he was invited to Göttingen to the university professorship of philosophy there. His "Metaphysics" (Leipzig, 1841), "Pathology" (1842), "Logie" (1843), "Physiology" (1851), "Mikrokosmos," his greatest philosophical work (three vols. 1856 to 1864), and his "History of Æsthetics in Germany" (Munich, 1868), are all works of the highest value and authority. The wide range of his physical and physiological knowledge, added to his daring in metaphysical speculation and his brilliant style both as author and lecturer, raised him to great eminence in the university world of Germany. He did not win equal fame at first outside his especial field of action; but in 1885 his reputation had grown so great in England among those who were conversant with the "unknown tongue" of later philosophical German, that several Oxford scholars of eminence united to form a joint translation of his works, which appeared in that year from the Clarendon Press, edited by Mr. Bernard Bosanquet.

Most philosophers in England are disposed to rank Lotze above either Schelling or Hegel. For one thing, he appeals

to the English mind by never leaving hold of fact, even when soaring into the abstrusest regions of ontological speculation. A metaphysician in whom common sense is ever present is certainly almost unique, and this is Lotze's peculiarity. A fine prophecy of Lotze's occurs near the end of the "Mikrokosmos" where he indicates the possible end of science as the attainment of a position from which at once the laws according to which, the forces through which, and the ends for the sake of which, things exist, should be demonstrated by any sufficient answer to the last of the three queries. Or in other words, he looks for the satisfaction of moral requirements even in the realization and operation of physical, mathematical, and psychical laws. Lotze died at Berlin in 1881.

LOUGH, an Irish term synonymous with the Scotch *loch*, but not with the English *lake*, for "loch" and "lough" are applied to designate arms of the sea as well as collections of fresh water, which the word "lake" is not.

LOUGH BOROUGH, a market-town of England, and the town second in importance in the county of Leicester, is 110 miles from London by the Midland Railway. The parish church, a handsome building, was thoroughly restored in 1862; there are two other churches, a Roman Catholic chapel, and chapels of the Congregationalists, Baptists, Wesleyans, and Unitarians. There is also a town-hall and corn-exchange, with large lecture-room; a grammar-school, and other schools, a union workhouse, barracks, a public library, news-room, and theatre. The chief manufactures are hosiery, bobbinet lace, cotton goods, shoes, and bells. The great bell for St. Paul's Cathedral, weighing 17½ tons, was cast here in 1881. The Leicester Navigation and the Loughborough Canal, communicating with the Trent and the Soar, increase the prosperity of the place. There is a railway from Leicester to Loughborough. The population of the town in 1881 was 14,803.

LOUGHREA. See GALWAY.

LOUIS BONAPARTE, King of Holland. See BONAPARTE.

LOUIS THE GREAT, King of Hungary (reigned 1342-82), and Louis II. (1507-26). See HUNGARY.

LOUIS I., Duke of Anjou and titular King of Naples (reigned 1382-84); Louis II. (1385-1417); Louis III. (1417-34). See ANJOU.

LOUIS, if we reckon in the poor little duple Louis XVII., was the name borne by eighteen kings of France, the first of whom was also Emperor of the Holy Roman Empire. The name is purely Teutonic, *Ludwig*; and was altogether unknown in France until the Karling dynasty of Frank kings.

LOUIS I., called *le Debonnaire*, and also *le Pieux*, son of Charles the Great, was made colleague in the empire in 813, and after the death of his father in the following year, succeeded him as King of France and Emperor. Louis was better fitted for the cloister than the throne, and the rule of his father's vast empire was far beyond his strength to wield. Therefore in 817 he summoned an assembly of the great barons of the empire at Aachen (Aix-la-Chapelle), and divided the government of the states of the empire between his sons Lothar, Pippin, and Louis. He retained the title of emperor, and named Lothar his colleague. In 829 he made another kingdom for his son Charles by a second marriage. The three elder sons revolted, feeling wronged. For a time the emperor was worsted, but at length regained his power. In 833 a second rebellion found him at its close quite crushed, and a prisoner in the hands of his sons. Yet again he was placed on the throne, and yet again the sons rebelled in 839. In the midst of these troubles he died in June, 840. Lothar was acknowledged emperor, and after a war against his brothers retained Italy, Provence, Burgundy, and Lorraine. Charles the Bald succeeded his father as King of France, and Louis of Bavaria had all Germany. Towards the close of Louis'

troubled reign the Northmen began those raids on France which in the next reign were to cost France her fairest northern province. Hasting was their leader, and their first great ravage occurred in 838.

LOUIS II., King of France, who must not be confused with Louis II. the Emperor (son of the first Lothar), was surnamed *le Bègue* ("the Stammerer"). In him began the rapid decay of the descendants of Charles the Great. He was born 846, crowned King of Aquitaine 867, succeeded his father Charles the Bald in 877, and was crowned by Pope John VIII. at Troyes in 878. He almost abandoned the kingdom to the care of this pope, who had been driven from Italy; and though he died in 879, in this short space he contrived to alienate and to lose by revolt the rich provinces of Brittany, Lorraine, and Gascony, as well as his shadowy kingship of Italy.

LOUIS III., King of France, son of Louis II., was born in 863, and succeeded his father in 879 jointly with his brother Carloman: Louis reigning over the north, Carloman over the south of France. Uniting their forces they managed to score victories over the Northmen in 879, 881, and 882; and had they lived their mutual good understanding might have availed to further the national resistance to these desperate foes; but both died young. Louis on a fourth campaign against the Northmen in 882, Carloman while hunting in 884.

LOUIS IV. was named *D'Outremer* (or "From beyond Sea"), because in 923, when an infant of two years old, he was taken to England for safety's sake by his mother, a sister of the English King Athelstan. Hugh the Great, count of Paris, who made kings as he chose without caring to take the throne himself, recalled Louis on the death of King Raoul (or Rodolph), whose line had died out. Louis was the son of the last previous legitimate king, Charles the Simple. Charles had been deposed in 920 in favour of Robert, duke of France, whose son-in-law Raoul succeeded him. When the English-bred lad of fifteen came over to France he found his kingdom limited to the county of Laon; all over the rest of France the various dukes and counts were far more powerful than he who nominally reigned over them. He had a truly royal soul, feeble as his kingdom was, and though he himself was no more than a boy, he gave Hugh the Great to understand that he meant to be no puppet king, and as soon as a terrible invasion of the Hungarians (937) had finished passing across the kingdom like a devastating scourge, he assumed the reins of power. Hugh at once formed a league of the great barons against him, and defeated him utterly before Laon in 941. Eventually, by the intervention of the Emperor Otto, the king's brother-in-law, and of William Longsword, duke of Normandy, peace was made. But soon after William Longsword was assassinated; Hugh and the king united at once to seize the boy duke Richard of Normandy, with the intention of robbing him of his duchy. However, a faithful retainer hid the lad in a truss of hay, and so carrying him on horseback through the royal guards escaped to a place of safety. Louis, once the little duke escaped, disavowed the plot loudly. Hugh meditated vengeance, and soon induced the men of Rouen first to seize Louis during a royal progress there (941), and next to deliver the king as prisoner over to himself. He refused to release him until Louis had given up Laon his capital (946). In this deep distress his brother-in-law Otto, emperor of Germany, came to his assistance. Louis retook Rheims, and soon after Laon also. A council of the church now forbade Hugh to remain in arms against his king, and on his contumacious excommunication him. Hugh had allied himself with Richard of Normandy, whom as a boy he had tried to wrong so foully, and in the ensuing war King Louis suffered terrible reverses. At last a peace was signed in 950. The king died in 954, but his last years, which were undisturbed by Hugh, saw worse

evils still, from the barbarian Hungarians, fall upon the little territory to which the kingdom of France had shrunk. In his struggle against so many evils Louis IV. wins our respect as a knightly figure among a degenerate race.

LOUIS V., King of France, *le Fainéant* (or "the Do-Nothing"), grandson of Louis IV., was born about 967, and was associated as king with his father Lothar in 978. He succeeded to the throne—a mere crowned phantom-king—in 986. He was the last of the race of the Karlings. Hugh Capet was already the real King of France in all but name. Louis died 987, and Hugh Capet succeeded him.

LOUIS VI., King of France, *le Gros* (or "the Fat"), son of Philip I., was born in 1077, and succeeded his father in 1108. The larger part of the kingdom was then in the hands of the great vassals of the crown, over whom the king's supremacy was but nominal. The duchy of Normandy was in the possession of Henry I. of England. Henry and Louis quarrelled about the limits of their respective states, and thus began the wars between the English and the French in France, which lasted for more than three centuries. Louis had the worst in several encounters, especially at the battle of Brennerville in 1119. Assisted by his minister Suger, abbot of St. Denis, Louis succeeded in recovering for the crown some of the power which the great vassals had usurped, and he began the creation of the third estate, or commons, as a check on their power. He died at Paris in 1137, aged sixty, and was succeeded by his son Louis VII.

LOUIS VII., King of France, *le Jeune* (or "the Younger"), was born 1120, succeeded his father Louis VI. in 1137, and married Eleanor of Aquitaine the same year. He proved at first as able a captain and as astute a ruler as his father, maintaining his rights against both priests and barons, opposing the encroachments of Pope Innocent II., and incurring an interdict therefor, a matter to which he paid little heed. The second Crusade was preached during this reign by Bernard, abbot of Clairvaux (St. Bernard), and Louis had a crime to expiate, namely, the burning, partly by accident, of 300 persons (some say 1300) in the church at Vitry, where they had taken sanctuary during a war with the Count of Champagne. Pope Celestine II. absolved him on condition that he took the cross. Leaving the kingdom to Abbot Suger's care, Louis VII. therefore led a large army of his subjects against the heathen (1147). Half his forces fell on the hills of Laodicea, and the expedition ended in disaster. Returning without his vanished army Louis was captured by pirates, and rescued only by Roger, king of Sicily (1149). His subjects looked askance on a king who had swerved so far from the knightly prowess of his earlier years, and the king turned more and more towards the cloister. Alarmed by a distant relationship with his wife, Louis obtained a divorce from Eleanor, and as the crafty Henry Plantagenet (soon to be Henry II. of England) was on the watch to snatch up the insulted and angry princess, Louis saw the greater half of his possessions—his queen's estates—pass to the control of his rival. When Henry II. came to the crown of England he held far more of France than the King of France did. Normandy, Anjou, Maine, Touraine, Poitou, and Aquitaine were all duchies or counties of Henry Plantagenet. It was with joy, therefore, that Louis learned of the bitter warfare afterwards waged between Thomas A'Becket and his sovereign, and with eagerness that he supported A'Becket and was ever ready to give him refuge when he fled for his life (1164). When the sons of Henry revolted against their father, Louis was at hand to succour them in every way, even the most dishonourable (1173). The two kings made peace when the English princes were overthrown (1178), and Louis made a pilgrimage (in 1179) to A'Becket's shrine. He had previously made a Spanish pilgrimage to St. James' shrine. He died, despised by his subjects, but in the full odour of sanctity, in 1179.

LOUIS VIII. of France, *le Lion* (or "the Lion"), was born in 1187; he was son of Philip Augustus and grandson of Louis VII. It was he who, as dauphin, was invited by the barons of England to come over and become their king when they intended to depose the tyrant John. Accordingly he made a descent at the head of an army upon England, and received the homage of the barons (1216). But John died during a campaign against his revolted subjects, and the barons of England, hoping for better times under John's young son (Henry III.), had no further need of Prince Louis. But he would not so lightly give up his hopes of the great prize before him, and besieged Dover, took Winchester, and fought a losing battle at Windsor in June, 1216. Dover siege had to be raised in November, but Hertford fell, and Berkhamstead also, in December. The papal legate now intervened to stave the discord which ravaged the unhappy kingdom, an interdict was threatened, and Louis unwillingly retired before the mingled and increasing force of spiritual and temporal opposition (1217). But he returned a few months after, on the news of a change in affairs and promise of support in London, was excommunicated in consequence, defeated at Lincoln by the Earl of Pembroke in May, lost his fleet conveying reinforcements in August by the brave Hubert de Burgh and the Dover fishermen, was besieged in London by Pembroke in September, and finally left England for ever as a condition of the siege being raised. In 1223 he succeeded at his father's death to the crown of France. Having finished a second crusade against the unhappy Albigensian heretics of the south, in imitation of his father, he reconquered Poitou (1224) and many important towns in other English provinces; and was overtaken by death when continuing his conquests and marching against Toulouse (1226).

LOUIS IX., King of France, called *St. Louis*, was born 1215, and succeeded his father Louis VIII. in 1226 when he was twelve years of age, under the regency of his mother, Blanche of Castile. During his minority a constant struggle prevailed between the crown and the great feudatories, in which the latter eventually triumphed. In 1248 Louis, who was full of ardent if somewhat monastic religious enthusiasm, set out on a crusade to the Holy Land. He landed in Egypt and took Damietta, but being defeated at the battle of Mansoura he was taken prisoner, compelled to pay a heavy ransom, and to restore his captures to the Mussulmans. From Egypt he sailed to Acre and carried on the war in Palestine, but with no success, till the year 1254, when, having heard of the death of his heroic mother and faithful queen-regent, he returned to France. He now developed quite unexpectedly into a statesman of considerable ability, formed the *parlement*, afterwards to become so famous, curbed the power of the nobles, published several useful statutes, known by the title of "Etablissements de St. Louis;" established a police at Paris, classed the various trades into companies called *confreries*, established the college of theology called La Sorbonne, reformed the coinage, created a French navy, and made an advantageous treaty with the King of Aragon, by which the respective limits and jurisdictions of the two states were defined. Louis also founded the Gallican Church as distinct from the general Roman communion by the promulgation of the famous *Pragmatic Sanction* forbidding papal taxes to be levied in France, and establishing a royal court of appeal from the decisions of the church courts. A feeling of fanaticism led him to another crusade, in which he met his death. He sailed for Africa, laid siege to Tunis, and died in his camp of the plague on 25th August, 1270. Louis' brother Charles, count of Anjou and Provence, took the kingdom of Naples from Manfred of Swabia, and established there the dynasty of Anjou.

Louis IX. was in intention perhaps the most truly Christian prince who ever filled a throne. As he felt that

the conquests of Louis VIII. and Philip Augustus, which were made at the expense of England when that country was torn by dissension, were wrongly gained, he proposed to Henry III. of England, his brother-in-law, to restore them; and in 1259 Perigord, Limousin, Saintonge, and other counties were given over to England, while Henry relinquished his rights over Normandy, Maine, Touraine, and Poitou. Struck by this magnanimity the English barons, then fighting against Henry III., besought Louis to mediate in their quarrel. He did so, decided for the king, and the barons laid down their arms (1264). Other questions, however, soon lit again the flames of civil war in England.

Yet, blinded by the prejudices of his time, this wise and zealous Christian was led to the cruellest decisions against Jews, heretics, and usurers. A hundred and fifty bankers of Asti were thrown into a dungeon for having lent money, though the interest charged was but moderate. The student will pierce through these husks of temporality to the eternal and shining goodness of this man's heart. He was canonized, the only one of his race, by Boniface VIII., 1297.

LOUIS XI., King of France and Navarre, called *le Hutin* (or "the Headstrong"), was born 1289, succeeded his mother Jeanne as King of Navarre, 1304. Like his brothers, sons of Philip the Fair of France, Louis was of the vilest life; and it is not to be wondered at that his queen, Margaret of Burgundy, should fall into crime. She was thrown into Châteaufort Gaillard, and as a new marriage with Cleopatra of Hungary became desirable, Louis had his first queen strangled (1315). This was the year after he succeeded Philip his father on the throne of France (1314). Plunged in his disgraceful pleasures Louis saw the power of the crown filched from him by the encroachments of the nobles, while the horrors of famine weighed heavily upon the neglected people, left at the mercy of their oppressors and feudal superiors. At this time might be seen in the streets processions to implore the mercy of God, made up of men entirely naked, so great was the misery of the kingdom. As a result of a final imprudence the wretched king died 1316, and though he left a daughter Jeanne, his brother Philip seized the crown, alleging an ancient Frankish law excluding females. This was the first application of the celebrated *Salic Law*.

LOUIS XII., King of France, one of the craftiest men who ever lived, and one of the subtlest and most unscrupulous of ingenuities, was born 1423, being the son of that Charles VII. to whom Joan of Arc restored the crown of France. In 1436 he married Margaret of Scotland; and in 1439, though yet in his boyhood, he headed a revolt against his father. It was not very successful, but he was pardoned and made governor of Dauphiné (1440). In 1442 he took command against the English in the south of France, and in 1443, in a northern campaign, made Talbot raise the siege of Dieppe. His military talents proving respectable, the Emperor Frederick III. asked his assistance, and he marched against the Swiss and defeated them near Basel (1444). He settled in Dauphiné, married a second wife, Charlotte of Savoy (Margaret had died), quite broke with his father, and refused to be seen at court (1451). Being detected in plots against his father, he fled to Brabant (1456), to the court of Philip, duke of Burgundy. Charles soon found he was surrounded by spies, and possibly, as he feared, assassins, in the pay of his son; he fell into a terror of being poisoned or murdered so great that he shut himself up without food and absolutely died of starvation, or of the weakening effects of abstinence incurred from sheer terror of his son's unscrupulous nature.

Louis justified his father's fears by the slow vengeance he took, as soon as he was master, on all who had thwarted him in his youth. He did more by cunning and dissimulation than by force of arms, but by the end of his reign he had firmly laid the foundations of that all-absorbing royal

supremacy which bore such bitter fruit under Louis XIV. and Louis XV., and eventually brought about the destruction of the body politic in the great Revolution. At the very beginning of his reign Louis was badly worsted at Montlhery (1465) by his brother and some chief barons led by Charles the Bold, the heir of the dukedom of Burgundy, and found himself obliged to grant Normandy to his brother. But calling together the estates of the realm he managed so to gain their suffrage that this body freed him from his oath, and ordered the Prince Charles to be content with the stipulated money allowance allotted to king's brothers (1468). Louis now turned to the work of strengthening his kingdom, granting charters to towns, and in every way raising up a popular power dependent upon the king only, to check the power of the nobles. At the same time he was intriguing with all the chief towns in the Netherlands dominions of his cousin Charles, now duke of Burgundy. At last the men of Liège rose, desirous of shaking off the yoke of Charles, and in the rising the Bishop of Liège lost his life. He was a near relative of Charles, and the duke soon discovering the cause of the outbreak was furious against Louis. Louis was on a visit to Charles at Peronne, to quiet his suspicion, when the news arrived; and Charles made him prisoner at once, and threatened him with death (1468). Louis vowed his innocence, and agreed in the treaty of Peronne to any terms proposed, to get out of the immediate peril: the duke was released from all his feudal obligations, and Louis accompanied him with a fresh army against Liège to put down the insurrection.

Louis returned to France outwardly thoroughly reconciled with the duke, but immediately on his return the duke's great friend in France, Charles, the king's brother, fell ill and died. It was tolerably evident that the king had had him poisoned, and the duke advanced against France to avenge his friend. Louis gained over his conductors and his allies, and the expedition came to nothing. He was equally fortunate with the English under Edward IV. Once free of the Burgundians, and their allies the English, he took a fearful vengeance on all their friends. The Cardinal La Balue was shut up for ten years in an iron cage 8 feet square, like a wild beast (1469). Louis had yet to slake his cold calculating vengeance upon his enemy and rival of Burgundy. He entered into a league with the Swiss, and it was not long before the fiery duke was plunged into war with them. He fell in the complete rout of his army at Nancy, 1477, in a campaign undertaken to avenge his previous defeat at Moret in 1476. On the news of his death Louis seized on Burgundy under some feudal pretexts, and thus becoming master of the person of the Duke of Nemours, one of the late duke's counsellors, had him executed, but with the refinement of ferocity of placing his children beneath the scaffold so that their father's blood sprinkled them.

But Louis had become prematurely old, and feared death with a terrible fear. He shut himself in the strong castle of Plessis les Tours, surrounded with guards and protected by mysterious punishments on all who approached without permission. The grand provost (executioner), Tristan l'Hermite, hung on the trees around the castle every stranger found there; and unable to trust to Frenchmen the king enlisted a bodyguard of Scotch nobles by means of his ancient relations with his first wife's country. He made frequent pilgrimages, was always in attendance at mass, and carried a number of leaden images of saints round his hat, to which he prayed at all moments of leisure. St. Francis of Paule, the hermit, and other holy men and women were called to him, but still his fears increased. At last he took the name of "Most Christian King," always afterwards borne by kings of France, and paid great homage to the Virgin Mary. In her honour he invented the prayers and ringing of the *Angelus*, he created her Countess of Boulogne, and consulted her before every act

of policy. An excellent view of the extraordinary mixture of abject fear and superstition as regards his miserable body and soul, with true courage and broad views as regards his state policy, and with brutal ferocity as regards his passions, is to be gained from Casimir Delavigne's well-known play, and Sir Walter Scott's masterpiece of "Quentin Durward." Such wonderful works of art, though not in one sense accurately historical, are in reality more valuable for the general public than many histories. Louis died in agonies of fear, at Plessis, in 1483. He had added to the crown Berry, Provence, Burgundy, Anjou, Maine, Ponthieu, Auxerrois, Macon, Charolais, Franche Comté, Artois, La Marche, Armagnac, Cerdagne, and Roussillon. He founded the provincial *parlements* of Grenoble, Bordeaux, and Dijon, decreed the irremovability of judges, took printing under his favour, was always keenly alive to the protection of commerce, equalized weights and measures, created a postal service, &c. In fact, France owed the germs of her later organization to his really profound wisdom. Had he been a better man he had been a truly great king. Knowing his own black conduct to his father he feared his own son (afterwards Charles VIII.) more than any other person living; therefore he kept him in the strictest discipline and in the densest ignorance. One sentence of Latin alone he caused him to learn (and all knowledge was then shut up in Latin): that was

"Qui nescit dissimulare nescit regnare."

LOUIS XII., King of France, who bears the splendid title *Father of his People*, was born in 1462. He was the son of the Duke of Orleans, who was a nephew of Charles VI. Louis of Orleans was therefore a cousin of Louis XI. of France, and as the Dauphin Charles was feeble in health, the astute king sought to make sure of his possible heir by marrying him to his daughter Joan, a princess of most unlovely presence. At once cousin and brother-in-law of Charles VIII., Louis of Orleans sought to obtain the regency when the latter came to the throne (1483); but Charles' sister, the famous Anne of Beaujeu, was able to secure the government of the kingdom, and the duke, not very loth, was left to the pleasure-loving habits in which the old king had so long by policy maintained him. In 1485 he joined some other discontented great nobles in an armed resistance to the authority of the Lady of Beaujeu, and civil war raged for nearly two years before the regent was able to confirm her authority by a crowning victory, won by La Trémouille at St. Aubin (1488), in which Louis was taken prisoner. He was not liberated till the king assumed the government in 1491. He accompanied Charles VIII. in his adventurous descent upon Italy under pretext of inheritance of the claims of the house of Anjou on Naples and Sicily. Louis of Orleans distinguished himself, defeating the Neapolitans at Rupello (1495), laying claim to the duchy of Milan as heir of his grandmother Valentina Visconti, taking Novara, and withstanding a subsequent siege of the place by the great Ludovico Sforza (Il Moro). The siege lasted till a treaty between Milan and France was concluded, by which Sforza was recognized as duke, and the French were allowed to leave Italy, where their position had become precarious. In 1498 Charles died childless, and Louis ascended the throne. His first act was to obtain a divorce from the abandoned Borgia pope (Alexander VI.) so as to marry the great heiress, Anne of Brittany, widow of the late king, the bribe offered being the duchy of Valentinois conferred upon the Pope's son, Cesare Borgia. His next was to raise his cousin Francis, count of Angoulême, to the dukedom of Valois; this prince eventually succeeded as Francis I. In 1499 Louis began to enforce his claim to the duchy of Milan, and his generals speedily overran the Milanese. Louis XII. entered Milan in triumph before the close of the year. The province revolted, but was

reconquered by La Trémoille in 1500, and Sforza was taken and imprisoned at Loches till his death in 1510. Master of North Italy, Louis now looked further, and in alliance with Ferdinand of Spain conquered Naples (1501), and almost at once quarrelled over the spoil with his confederate. Gonzalvo, the Spanish general, beat the French at the two battles of Seminara and Cerignola, and soon the French had only Gaeta left to them in Southern Italy. Louis sent a new army into Italy and two armies into Spain; but at this juncture Borgia died, and the new pope, Julius II., was violently anti-Gallican in his policy. In spite of the valour of the immortal Bayard the French were driven from Naples by a united Italy. Louis was dangerously ill at this time. On his recovery he summoned the states-general at Tours (1504), and at their request annulled a project of marrying his daughter Claude to the young Prince Charles of Spain (afterwards the Emperor Charles V.), and betrothed her instead to his cousin and heir, Francis of Angoulême. Thus Brittany, of which Claude's mother was sovereign duchess, was for ever united to the crown of France, and the king received from the states-general his honourable surname. Assisted by them, he again descended on Italy, suppressed a revolt at Genoa (1507), joined in the league of Cambrai (1508) with the Pope, the Emperor, and the King of Spain against Venice, only to find his enemy and his friends immediately after arrayed against him in the Holy League. Gaston de Foix, the king's nephew, though only twenty-three, performed prodigies of valour, winning three victories in as many months, but perishing at the battle of Ravenna in 1512. With him perished the fortunes of the French. Louis XII. was excommunicated by the Pope, and it was only by an alliance with Venice that the French troops were enabled to withdraw from Italy. Even then they were humiliated by a defeat at Novara at the hands of the Swiss, allies of the Emperor Maximilian (1513). The same year saw a victory of Henry VIII. and the English, who had joined the league against France, at Guinegate in Artois; it was called the *Battle of the Spurs*, because of the complete rout of the French cavalry. The hope of a Scotch diversion failed at Flodden, in the same year; and the victorious Swiss were besieging Dijon, while the Spaniards were crossing the Pyrenees. Louis, beaten on all sides, hurriedly concluded peace (1514). To confirm this he sought the hand of Mary of England, Henry's sister, since his queen, Anne, had died some time before. This marriage of a man of fifty-three with a girl of sixteen gave no very happy result; the king died, 1st January, 1515, very shortly after its celebration. Perfidious and violent in his foreign policy, Louis was a good king in home affairs, and never lost the affection of his people. His minister, George, cardinal d'Amboise, to whom we owe many fine monuments of Renaissance art, was as much respected as the king. "Laissez faire Georges" was a proverb of the time.

LOUIS XIII., son of Henri Quatre and of Maria de' Medici, succeeded his father in 1610, being only nine years of age, under the regency of his mother. In October, 1614, he was declared to be of age, and in the following year he married Anne of Austria, daughter of Philip III. of Spain. Concino Concini, *maréchal d'Aucre*, a Florentine, the favourite minister of the queen-dowager, had by his insolence and his intrigues excited considerable jealousy, and was assassinated at the instigation of the king (1617). The parlement of Paris declared him to have been guilty of treason and sorcery; and on the same charges his wife was afterwards beheaded and her body burned. The queen-dowager was sent to Blois under arrest. Some years after the queen-dowager escaped from Blois, and being supported by several nobles a civil war broke out; but Armand du Plessis, bishop of Luçon, known afterwards as Cardinal and Duc de Richelieu, acted as mediator, in consequence

of which he obtained a cardinal's hat, and in 1624 became chief minister, which he continued to be till his death in 1642. Richelieu checked the ambition of the House of Austria, and acquired for France considerable influence in the affairs of the Empire. In 1628 Richelieu captured La Rochelle, the great stronghold of the Protestants of France. The French armies took an important and generally a successful part in the Thirty Years' War; they acted on the Rhine in concert with the Swedes, and while another French army carried on the war in Italy against the Spaniards, a third army was fighting in Flanders, and a fourth on the frontiers of Catalonia. The great object of Richelieu was to render the government of the king absolute, and in this he succeeded. He at the same time patronized learning and the fine arts, established the royal press, and embellished Paris. Richelieu died in 1642, and the king in May, 1643.

LOUIS XIV. (*le Grand Monarque*) was born at St. Germain-en-Laye, 16th September, 1638, and succeeded his father, Louis XIII., when hardly five years old. Cardinal Mazarin was the minister under the regency of Anne of Austria, the queen-mother. The treaties of Münster and Osnabrück (1648) put an end to the Thirty Years' War, and Mazarin concluded the peace of Westphalia. The same year, however, that the war in Germany was terminated, the civil war of La Fronde broke out in France. [See FRONDE.] This war lasted with some intermissions till 1652, when Condé, one of the chief leaders of the Frondeurs, emigrated to join the Spaniards, and Cardinal de Retz, another of their supporters, was imprisoned. During the continuance of the war the court were twice obliged to leave Paris, and the consequence of a temporary reconciliation was the disgrace and exile of Mazarin in 1651, who, however, returned and resumed his ministry in 1653. In 1654 Louis XIV. made his first campaign in Flanders against the Spaniards. In the following year he concluded a treaty of alliance with Cromwell, Lord Protector of England, against Spain. The war continued that and the next year with varying success; Lureme commanded the French troops, and the Prince of Condé fought on the side of the Spaniards against his own country. In 1657 the Emperor Ferdinand III. died, and Mazarin, in trigued, by means of bribery and promises, to prevent the election of his son Leopold, and to obtain the imperial dignity for Louis XIV. But he was unsuccessful; even those who had received his pay turned in favour of Leopold, who was unanimously elected in 1658. From that time began the bitter animosity of Louis against Leopold, which lasted half a century, and was the cause of three long and bloody wars. Meantime the war with Spain was brought to a close in November, 1659, by Cardinal Mazarin, by the treaty of the Pyrenees, and the marriage of the Infanta Maria Teresa, daughter of Philip IV. of Spain, to Louis XIV. Spain gave up Artois and Roussillon, and stipulated for a free pardon to the Prince of Condé. Louis XIV. never felt any affection towards the queen, and he resorted to the society of a succession of mistresses, of whom Mlle. de la Vallière and de Fontange, and Madame de Montespan are the best known. In February, 1661, Mazarin concluded at Vincennes a third and last treaty with Charles, duke of Lorraine, by which Strasburg, Pfalsburg, Stenai, and other places were given up to France. Nine days after this treaty Mazarin expired, at fifty-nine years of age.

On the death of Mazarin Louis XIV. took the reins of government entirely into his own hands. He banished and imprisoned Fouquet, the minister of finance, on charges of speculation and treason. In appointing Colbert in his room Louis made a good choice, and much of the splendour of his reign is due to that able minister. [See COLBERT.] Louis XIV. completed the work begun by Richelieu; he changed France from a feudal monarchy into an absolute one. After the death of Mazarin he admitted no more

ecclesiastics into his council. The spirit of jealousy of the Gallican Church made it less dependent on Rome, and more subservient to the crown. The parlements were also subdued, like the nobility and clergy, by the absolute will of Louis, and offered little or no impediment to the royal authority. "L'état c'est moi," his famous saying, explains the whole principle of his policy. He established that system of centralization in the administration which has been followed and rendered more complete by succeeding governments, and which has rendered France the most compact power in Europe. His reign was a brilliant epoch of learning in France. In his patronage of the arts he displayed more pomp than taste.

Louis XIV. hated the Protestants, not so much from religious bigotry as because he considered them rebellious subjects. This led him to that most unjust and disastrous measure, the revocation of the Edict of Nantes in 1685, by which Protestantism was proscribed in France, and by which that country lost thousands of its most industrious citizens. The persecution of the Jansenists was another consequence of the king's intolerance. This new attitude of the king was in very great part due to the fatal influence of Madame de Maintenon, once governess of the king's illegitimate children, who had been able to attract his attention and resist his addresses in such wise that he had secretly married her shortly before this time. The court, once so brilliant, grew dull and gloomy, and France plunged into terrible disasters.

The first war of Louis XIV. was against the Emperor Leopold, Holland, and Spain in the happier early times of the reign. It ended with the treaty of Nimeguen, 1678, and Louis kept the Franche Comté and part of the Spanish Netherlands. The war broke out again in 1689, between Louis on one side, and the Empire, Holland, and England on the other. In Germany Louis XIV. sanctioned one of the most atrocious acts recorded in the history of modern warfare. This was no less than the devastation of the Palatinate by his commanders, under the pretence of forming a barrier between the French army and its enemies. A cry of indignation resounded throughout all Europe at the disastrous news. The treaty of Ryswick, in 1697, terminated the war, a succession of costly failures, and Louis was compelled to acknowledge William III. as King of Great Britain and restore the Duke of Lorraine to his dominions. Louis still continued to afford an asylum to James II. of England. The third war of Louis was that of the Spanish Succession. It began in 1701, and lasted thirteen years, convulsed all Europe, was distinguished by the splendid victories of Marlborough, and was terminated at last by the peace of Utrecht in 1713. Louis succeeded in establishing his grandson Philip on the throne of Spain, but this was the only advantage he gained.

Louis XIV. died 1st September, 1715, seventy-seven years of age. His reign of seventy-two years is the longest recorded. The multitude of court charges and privileges, the separation of the aristocracy from the common people, the centralization of authority, the grinding taxation necessitated by the costly wars, and the scarcely less costly follies of splendour, among which Versailles, St. Germain, Marly, &c., figure, laid the ground of the revolution which three-quarters of a century later was to ruin Old France.

LOUIS XV., born in February, 1710, was the only surviving son of the Duke of Burgundy, eldest son of Louis the Grand-dauphin, only legitimate son of Louis XIV. The dauphin died in 1711, and his son, the Duke of Burgundy, in 1712. The mother of Louis XV. was Maria Adelaide of Savoy, who also died in 1712. Philip, duke of Orleans, only nephew of Louis XIV., was appointed regent. He was a man of licentious habits, equally destitute of religious and moral principles. But his rule began well; he reformed several of the most outrageous abuses of the late

reign, he liberated a number of individuals who had been for years immured in the Bastille, he enforced economy, reduced the army, supported the general peace of Europe, courted the friendship of England, and concluded the triple alliance of the Hague in 1717, between France, England, and Holland. Unfortunately, the depressed state in which he found the finances made him listen to the wild schemes of Law, which ended in disappointment and the ruin of thousands of families. [See LAW, JOHN.] The discovery of a conspiracy, encouraged by Philip of Spain, against the regent, led to a war with that country. But peace was concluded in 1720. In 1722 Dubois, who had been made a cardinal, though he was if anything still more degraded in dissipation than the vile regent, became prime minister of France.

In February, 1723, Louis XV., having completed his fourteenth year, was declared of age, and the regency of the Duke of Orleans terminated. Dubois died the same year, and the Duke of Orleans a few months after. The Duke of Bourbon-Condé was made prime minister, and governed France until 1726. Louis married, in 1725, Maria Lezinska, daughter of Stanislaus, ex-king of Poland. In the following year the Abbé de Fleury succeeded to the ministry. The seventeen years of Fleury's administration, which ended with his death in 1743, were the brightest period of this reign. Fleury restored order in the finances, and credit and commerce revived. In 1733, on the death of King Augustus II., the war of the Polish Succession broke out, when Louis XV. took the part of his father-in-law, the ex-king Stanislaus, against Austria and Russia.

Hostilities were carried on between France and Austria both on the Rhine and in Italy. France gained great success in this first war; but that of the Austrian Succession, which broke out in 1741, involved her in ruinous expenses to no purpose. In her later struggle with the English in America, which arose out of the Seven Years' War, France was equally unfortunate. By the peace of Paris, February, 1763, she formally ceded to England Canada, Nova Scotia, and her other North American colonies, besides Granada, Dominica, and Tobago, in the West Indies; her navy never recovered from its losses, her finances were exhausted, and her commerce destroyed. The king had abandoned himself to gross licentiousness, no lady at his court being free from his vile pursuit. A characteristic trait of him is the fact that while three sisters were his acknowledged mistresses at one time, he was endeavouring to gain a fourth also. He had become careless of state affairs. After the death of his principal mistress, the Marquise de Pompadour, who, when she could no longer secure the wretched man's affection, degraded herself to supply the "Pare aux cerfs" with fresh beauties for his jaded taste, so that her tenure of state power remained to her till her death, he became attached to mere vulgar women, and France saw one of these detestable creatures, with the title of Countess Du Barry, aping the government of France under the admiring dotage of the king. Probably Louis XV. in sheer bestiality exceeds any prince since the middle ages.

Louis died at Versailles on the 10th May, 1774, sixty-four years of age. Two sons whom he had had by his wife were both dead: the eldest, the dauphin, died in 1765, and left by his wife, a Saxon princess, three sons, who were in succession kings of France—namely, Louis XVI., Louis XVIII., and Charles X. Louis XV. had also several legitimate daughters and many illegitimate children.

LOUIS XVI., grandson of Louis XV., succeeded him in 1774, being then twenty years of age. He had married, in 1770, Marie Antoinette, archduchess of Austria, sister of Joseph II. He chose for his minister of finance Turgot, an honest and enlightened man, who, in concert with his colleague Malouin, wished the king to institute various reforms, which, had they been carried out, might perhaps have prevented the Revolution. But the lawyers, the

clergy, and the nobility strongly opposed these projects. The deficiency in the treasury, and the debt of 4,000,000,000 of livres left by Louis XV., were hopeless burdens; and yet Louis engaged in a war against England, in alliance with her revolted American colonies. In September, 1783, peace was concluded at Versailles; England acknowledged the independence of the United States, and gave up to France Tobago and the coast of Senegal.

Meantime the financial embarrassment of the French government went on increasing. Necker, a Genevese banker, wealthy and retired from business, having become minister of finance in 1776, effected many reforms. But in November, 1783, by a court cabal, he was dismissed and Calonne substituted in his place. Calonne soon found it impossible to reorganize the finances; and after the Assembly of the Notables, which had been convoked for the purpose, had also failed to settle the question, and several successive ministers had tried in vain to supply the financial deficiency, Necker was recalled. He stated to the king that the only resource left was to call together the States-general of the kingdom, which had not been assembled since 1614. The king convoked them at Versailles in May, 1789. These states had always consisted of the three orders—the clergy, the nobility, and the third estate, or commons. On the States general assembling, the third estate was joined by many of the nobility, and, having thus gained the ascendancy, constituted itself the National Assembly, and among numberless other radical reforms, changed the constitution to a limited monarchy.

The history of the well-meaning but utterly spiritless king, who would have made an excellent locksmith, but was totally unfit for coping with the titanic forces of the Revolution, is thenceforward the history of the Revolution itself. In 1789 the king was compelled to move from Versailles to Paris, after the fall of the Bastille. He endeavoured to escape from what was but gilded imprisonment, but was taken prisoner at Varennes and brought back, 21st June, 1791. His brothers, more fortunate, escaped to Coblenz. In September the king accepted a new constitution (never meaning honestly to keep it), and the new Legislative Assembly met. In 1792 the Girondist ministry was appointed, and things mended a little; but the insurrection of 20th June, and the massacre of the king's Swiss body-guards on the 10th August, showed the mob its power. The king and his family were flung into the Temple prison, the National Convention was summoned, and on its first meeting, 22nd September of the same year, abolished royalty. It was not long before "Louis Capet" was hailed before the bloodthirsty mock-tribunal (11th December), and by the cowardice of the Girondists in a critical moment was condemned to death without delay, his cousin, the Duke of Orleans, voting with the majority (20th January, 1793). He was executed the next day by the common guillotine, and his queen, whose virtues rose as the star of her fortunes sank, till from a giddy heartless princess she has become one of the grandly pathetic heroines of history, suffered the like fate in the following October.

LOUIS XVII., Duc de Normandie, second and only surviving son of Louis XVI., remained in prison in the Temple after the death of his parents, and there he died of dirt and disease, in consequence of the most barbarous intentional neglect and privation, on the 8th of June, 1795. He was then ten years of age. He had been proclaimed Louis XVII. by the royalists of Coblenz after his father's death. The certificate of death was given by the physicians four days after death, on seeing a corpse which, as they report, "they were told was that of the son of Louis Capet." As it was easy to throw doubt on the death of the poor boy in prison (see M. Louis Blanc's work on the subject) numerous pretenders have appeared purporting to be the true Louis XVII., the boy who died in prison being alleged to be a substitute. One of these was imprisoned

in the Bicêtre by Napoleon, and died there in 1812. Bruneau, a cobbler, in 1817; Richemont, a pseudo-baron, who died in 1853; Eleazar Williams, in America, who died in 1858, are other examples. But the most famous is a clockmaker named Charles William Naundorff, a Prussian Pole, whom the Prussian government put in prison in 1822 for asserting his claim. In 1833 Naundorff entered an action in Paris before the civil tribunal of the Seine to obtain his "right;" he lost it, was expelled from France, and thereafter lived in Holland, supported by those who believed in his tale, till his death in 1845. His tomb was inscribed "Charles Louis, Duke of Normandie, son of Louis XVI. and Marie Antoinette of Austria." A son of Naundorff, Albert Naundorff, born in England, revived the claim, and his mother, then a widow, brought a second action in Paris, in Albert's favour, in 1851. Jules Favre being the counsel, which failed. In 1863 Albert Naundorff took up his naturalization as a Dutch subject, and in 1871, as Captain Albert de Bourbon, captain in the Dutch army, he sued the Comte de Chambord, titular head of the House of Bourbon, for his family honours. Again Jules Favre pleaded, and a curious story of a sham burial and an empty coffin, the secret having been betrayed by Josephine, wife of Napoleon, who had examined the said coffin, with many other wonderful things, failed once more to impress the jury. No more was heard of Captain Albert de Bourbon till the death of the Comte de Chambord in August, 1883, when he protested against the succession of the Comte de Paris, and proclaimed himself King of France. He died two months after at Breda.

LOUIS XVIII. was born in 1755. He was the brother of Louis XVI., during whose lifetime he was styled "Monsieur." His title was the Count of Provence. He assumed to be regent for his nephew, Louis XVII., and took part in the Prussian invasion of France in 1792. On the death of the boy king being announced he assumed the royal title. In 1807 he took refuge in England, and on the downfall of Napoleon in 1814 was put upon the vacant throne by England, Austria, and Russia. He granted his subjects a liberal charter, which continued to be the fundamental law of the kingdom, with the exception of some alterations made in 1830, until the Revolution of 1848. On the return of Napoleon from Elba Louis escaped to Ghent; but the victory of Waterloo, June, 1815, again opened to him the way to Paris by favour of the allies.

The assassination of his nephew, the Duke of Berry, by a fanatical republican in February, 1820, alarmed Louis, and restored the influence of the ultra-royalists. The liberal minister, Decazes, was dismissed, and the reactionary, Villèle, was placed at the head of the ministry. The law of election was altered, the newspapers were placed under a censorship, and other measures of a retrograde nature were adopted. No open violation of the constitution, however, was committed. In September, 1824, Louis XVIII. died, and was succeeded by his brother Charles X. He published, in 1823, the account of his emigration, "*Rélation d'un Voyage de Paris à Bruxelles et Coblenz*," which is curious.

LOUIS PHILIPPE. King of the French, was born at Paris in 1773, and was the eldest son of Philip Joseph, duke of Orleans, the notorious "Egalité" of the Revolution. His mother was descended from the Count of Toulouse, a natural and legitimized son of Louis XIV. by his mistress De Montespan. He was carefully educated under Madame de Genlis, the eminent French authoress. The title he bore in his youth was Duc de Chartres; and he was then distinguished by many traits of liberalism and manly courage. He was actively engaged against Austria in the revolutionary campaign of 1792, and took part in the battles of Valmy and Jemappes, under Kellermann and Dumouriez. During the violence of the Revolution the duke's father was put to death, and a few months afterwards he himself, with

General Dumouriez, was summoned before the Committee of Public Safety; but knowing the sanguinary character of that tribunal, they both effected their escape into the Belgian Netherlands. Orleans then retired into private life, honourably refusing to accept Austrian offers to take up arms against his own country. He proceeded to Zurich, whence he was soon obliged to fly, and wander, with very inadequate means, through the different countries of Europe. At length, being only twenty years of age, he obtained the situation of teacher in the academy of Reichenau, a village in the south-east of Switzerland, where he passed under the name of Chabaud Latour. In 1794, his retreat having been discovered, he was obliged to flee, when he travelled, chiefly on foot, through Norway, Sweden, Finland, and Denmark, under an assumed name. He went to the United States in September, 1796. In February, 1800, he came to England with his brothers, and they took up their residence at Twickenham. His two brothers, the Duc de Montpensier and the Comte de Beaujolais, died respectively in 1807 and 1808. In 1809 the duke, his mother, and his sister went to Sicily, where they had been invited by King Ferdinand. Here the duke contracted marriage with the daughter of the king, the Princess Marie Amelie. At the Restoration the Duke of Orleans returned to France, and was soon put in possession of the honours and estates to which he was entitled. On the return of Napoleon from Elba he was again obliged to quit France. But after the Hundred Days he revisited his native country, where, having offended the Bourbons by opposing their reactionary measures, he lived in comparative retirement, until the startling revolution of 1830 drove Charles X. and the elder Bourbon house from the country, and elevated the Duke of Orleans to the throne. The friendly feeling of England towards the new order of things was illustrated by the mutual visits of Queen Victoria and Louis Philippe, in 1843-44, when the King of the French was invested with the order of the Garter (1844).

During a period of seventeen years Louis Philippe ruled peaceably, and contributed largely by his policy to the prosperity and greatness of the country. He was several times a mark for attempts at assassination, especially by the murderous infernal machine of Fieschi (1835), when eighteen of his suite were killed and forty wounded. But at length he alienated the whole of Europe by the dishonourable subtleties of diplomacy resulting in the "Spanish marriages," the young Queen Isabella becoming the wife of Francis of Assisi, with a practical certainty of leaving no heir, and her sister marrying the French Prince Montpensier. The result was admittedly to replace a French prince upon the throne of Spain in the long run, contrary to the treaty of Utrecht, to say nothing of more modern undertakings. A succession of gross blunders also alienated the people of France from the government, and the cry of reform rose all over France. An unwise resistance provoked the people to organized demonstrations. One of these was unhappily the cause of bloodshed, riots began in Paris, and in 1848 the king was ignominiously driven from the throne. He hurriedly signed an abdication in favour of his grandson, the young Duke of Orleans, but no notice was taken of this futility. An order to Marshal Bugeaud to use force admittedly would have saved the kingdom, but Louis Philippe lacked the necessary firmness to give it. He fled from Paris, and landed at Newhaven, in March, 1848. Claremont, the property of his son-in-law the King of Belgium, was assigned him as a residence. Here he chiefly lived in retirement until his death, which took place in August, 1850. He was privately interred at the Roman Catholic chapel at Weybridge, in Surrey; but in 1876 his remains, together with those of his wife, who had also died in England, were taken to France.

LOUIS-D'OR, a French gold coin first struck in 1640, in the reign of Louis XIII. It was valued at from 16s. 7d.

to 18s. 9½d. and continued in use till 1726, when it ceased to be a legal tender. Louis-d'ors, however, continued to circulate in Germany and Switzerland, where they had a certain fixed value, and upon the return of the Bourbon family to France, in 1814, their use was revived in that country, their value then being twenty francs. They were subsequently replaced by the "Napoleon" of the same value.

LOUIS, ST., a city of Missouri, in the United States, situated on the west bank of the Mississippi, about 18 miles by water below the mouth of the Missouri. The river here has a double bank, and the city is chiefly built on the interior bank, which has a gradual rise, and is about 40 feet higher than the bank next the river. A railway bridge across the Mississippi was opened in 1874. The city presents a handsome appearance, and the grouping of buildings is as picturesque as that of a continental city. There are numerous fine public buildings, the principal one being the magnificent exchange, erected in 1871-75, said to be the most splendid of its kind in all America; while from the banks of the river, on ridge after ridge, rise acres of solidly-built houses, vast manufactories, magazines of commerce, long avenues bordered with stately residences, and a perfect labyrinth of railways, more than fourteen important lines having their termini in the city, while at least thirty others touch upon its borders. The place is excellently situated for commerce, and with the adjacent vast stores of rich iron ore it is anticipated that St. Louis may some day become the centre of a region producing as much pig iron annually as is now produced in the whole of Great Britain. Besides the enormous ironworks, there are numerous other manufactories carried on. The city has leapt into new life since the war, and has nearly trebled its population. This in 1835 was 8000; in 1860, 160,773; and in 1880, 350,518.

LOUISIANA, the most south-western of the United States of North America, comprehends the countries on both sides of the Mississippi, between 28° 56' and 33° N. lat., and 88° 50' and 94° 30' W. lon. It is bounded S. by the Gulf of Mexico, W. by Texas, E. by the state of Mississippi, and N. by that of Arkansas. The greatest length, N. to S., is 290 miles; the greatest breadth, E. to W., is 210 miles. The area is 45,420 square miles, and the population in 1880 was 940,263.

Surface and Soil.—Louisiana presents a great variety of surface, though it is a plain country, and only in a very few places rises into hills of moderate elevation. The southern part of the state comprehends the whole of the delta of the Mississippi, which below the mouth of the Red River divides into several branches. The most western of these branches is the Atchafalaya, which leaves the main stream about 3 miles below the mouth of the Red River, and falls into Atchafalaya Bay, in the Gulf of Mexico. The southern part of the state consists, to a considerable extent, of swamps and marshes, and a large part of it is annually overflowed by the Red River and the Mississippi. By this overflow more earth is deposited on the margin of the Mississippi than further back. This rich alluvial deposit extends 400 yards, and in some places 1½ miles from the river; and to regulate the overflow, and prevent the valuable land in the rear from being inundated, an artificial embankment, called the *Levee*, is raised on both banks of the river. On the eastern side the embankment commences 60 miles, and on the western, 172 miles, above New Orleans. The northern part of the state has an undulating surface, and a heavy natural growth of timber, consisting of pine, oak, hickory, walnut, and other trees. In fact, the greater portion of this state is covered with forests, which are, however, more swampy than those of the other southern states. For building and settlement purposes land is abundant and cheap. The city of NEW ORLEANS, the capital, extends over an area of 36 square miles.

The chief rivers in this state are the **MISSISSIPPI** and its affluent, the **Red River**.

Products, &c.—From the great areas of exceedingly rich land in Louisiana, large quantities of cotton, sugar, rice, maize, indigo, and tobacco are produced. Large herds of cattle are fed in the natural meadows, and also great numbers of horses and mules. Panthers, deer, &c., are numerous, and alligators swarm in the waters. The winters are mild, the summers very hot, and in the marshy parts rather unhealthy, being liable to visitations of yellow and bilious intermittent fevers. The soil is laid out in fine plantations along the river banks, and agricultural occupations are decidedly the most profitable in the state. Oranges, and most other southern fruits, are grown in abundance. The manufactures and minerals are of little importance. There are salt springs in the northern districts, and coal and iron are found in the north-western corner of the state.

Louisiana is divided into forty-seven parishes, answering to the counties of other states. Several railways and canals radiate from New Orleans in various directions. Owing to the great facilities of water carriage railways were much deferred, but the state is now well supplied. The state seceded from the Union early in the Civil War. Its capital was taken by the Federals in 1862, and was subject to military government until the close of the struggle.

Louisiana was first explored by the French, and was so named after Louis XIV. It was originally settled in 1699 by Roman Catholics, and they are still the most numerous religious body. In 1717 the interest in the province was transferred to a chartered company, at the head of which was John Law, whose Mississippi speculation was a ruinous failure. In 1731 the company resigned its rights to the English government, by which, in 1762, the whole of Louisiana was ceded to Spain. In 1800 the province was transferred by the Spaniards to the French, from whom it was purchased by the United States in 1803 for 15,000,000 dollars.

LOUISVILLE, a city of the United States, the largest town of Kentucky, and the sixteenth in point of size of the Union, is situated on the south bank of the Ohio, about 50 miles W. by N. from Frankfort. The Ohio is nearly a mile wide opposite the town, and there is a very large traffic on it by steamboats and river craft. This city, now covering an area of more than 13 square miles, and so favourably situated as a market for the tobacco of Kentucky and as a depot for the produce of the cotton states, owes its existence mainly to the rapids of the Ohio, which here stop vessels from the south and west. To avoid these rapids a canal $2\frac{1}{2}$ miles long was cut through the limestone rock. In 1800 the population was but 600, in 1880 it was 123,758. It is regularly and evenly built, with a frontage along the river of more than 8 miles, which is connected with the opposite side by a bridge of 27 spans, 1739 yards in length. It has numerous fine buildings, among which the city-hall, the court-house, the public library, the female high school, the school for the blind, the Roman Catholic cathedral, and the exhibition building, may be mentioned. The educational institutions are very numerous and include four medical colleges. The trade in leaf tobacco is enormous. Pork-packing, leather manufacture, whisky distilling, and machine making are carried on on the largest scale. A well-known artesian well, which yields a large supply of mineral waters, is sunk to the depth of 2066 feet. Louisville is named after Louis XVI. of France. It was founded in 1780, and incorporated in 1828.

LOURDES, a town of France, in the department of Hautes-Pyrénées, is situated on the Gave-de-Pau, and is built at the meeting of five highroads round an almost inaccessible rock, surmounted by an old though strong castle of the counts of Bigorre, and on the slopes of a ravine which is traversed by a torrent. The houses are pretty well built, but from the nature of the ground the streets are irregular. The town has a civil tribunal, and 5801 inhabitants. It is

a very ancient place; remains of old towers, said to have been constructed by Julius Cæsar, and other extensive Roman ruins, may still be seen. The castle on the top of the hill is now used as a prison. In the neighbourhood are some marble and slate quarries. By the treaty of Bretigny, this town, with the rest of Bigorre, was ceded to the English as part of the ransom of the French King John. The history of Lourdes forms an admirable story in Froissart. In modern times it has become famous as a place of pilgrimage to Roman Catholics on account of a cave in the vicinity in which the Virgin is said to have appeared to a young girl in 1858. Thousands visit the spot every year to pray or to be cured of their infirmities, and the chapel is decorated with votive offerings of crutches and other invalid appliances.

LOURE, like *Horupipe*, from meaning originally a musical instrument, came to mean exclusively the kind of dance tune suited to the powers of that instrument. Originally a loure was a kind of bagpipe; and as a slowish dance in 6-4 time was often accompanied by its rival tones the dance came to have the same name, and was continued long after the old rude pipe had disappeared. A loure was slower than a gigue. It is used by Bach, Handel, &c., as one of the forms of their suites or collections of dance-forms, ancestors of the sonata.

LOUSE is the name of some small insects, forming the section *Pediculina* or *Azoplnra*; they are to be regarded as degraded *Hemiptera*, in the same way as another human parasite, the flea, is a degraded member of the order *Diptera*. The body is wingless, flattened, and almost transparent. The thorax is small, and the segments are indistinct. The abdomen is large, oval, with nine segments. The antennæ are thread-like, and composed of five joints. The legs are short, having only two joints to the tarsus, the last of which is claw-like and bent back towards the basal joint. The eyes are minute. The mouth consists of a beak-like sucker, consisting of a tubular sheath formed by the labium, provided with hooks at each extremity, and inclosing a delicate membranous protrusible tube. The whole mouth is fleshy and retractile.

Lice are all parasitic on various mammals, each species having its own particular host as a rule. Three of these disgusting animals infest man. The common head louse (*Pediculus capitis*) is found among the hair of the head. It does not burrow beneath the skin, but sucks the blood, causing much irritation. The female lays small pyriform eggs or *nits*, and attaches them firmly to the hairs. In about eight or nine days the eggs are hatched; and the young at the age of eighteen days are mature and able to lay eggs. The body-louse (*Pediculus vestimentis*) is found on the skin, or on the linen in various parts of the body. Another allied species is the crab louse (*Phthirus pubis*), found on the eyebrows and in the pubic region.

The terrible disease known to the ancients as *phthiriasis*, which destroyed among others Antiochus Epiphanes, Sulla, and the two Herods, was probably caused by lice; and a special species, *Pediculus tabescens*, which is said occasionally to appear on the body in immense numbers, has been assigned as its cause. But in some cases this disease may have been due to the attacks of mites.

The bird-lice belong to the section *Mallophaga*.

LOUTH, a maritime county of the province of Leinster in Ireland, is bounded N. by Armagh and Down; E. by the Irish Channel; S. and S.W. by Meath; and W. by Monaghan. The greatest length, N. to S., is 25 miles; the greatest breadth, E. to W., is 15 miles. The area is 315 square miles, or 202,124 acres, of which 100,000 are under tillage, 73,000 pasture, 4000 in plantations, and 26,612 waste, bog, &c. The population in 1881 was 78,228.

Surface and Rivers.—From the Boyne to the river of Dundalk the county is mostly flat. The only eminences in this division at all conspicuous are in the southern part

of the county: the chief among them are Belpatrick, Mount Oriel, Tullyesker Hill, and Clogher-head. The Mattock River forms a boundary between Louth and Meath. The undulating plain, which extends from the hills to the river of Dundalk, is watered by the Dee, the Glyde, the Fane, the White, the Lagan, and other small rivers. Most of this district is under tillage, and in good cultivation.

Beyond the Castletown River the surface is of quite a different character. A group of mountains, ranging from 1000 to 1900 feet in height, and extending over a district 15 miles long and 5 miles broad, stretches across the Armagh border, and extends eastward into a great peninsula forming the northern boundary of the Bay of Dundalk and the southern limit of the Lough of Carlingford and basin of the Newry River. This group is divided into two nearly equal portions by a ravine traversing it from north to south, and forming a direct line of communication between Dundalk and Newry. Though this defile the great northern road is carried at a considerable height above the bed of a mountain stream. The Kileurry River, descending from the southern declivities, joins the Castletown River a short distance above the bridge of Dundalk. The glens and valleys which lie along this border of the mountain region possess much picturesque beauty. From the eastern side of Rensdale the mountains stretch back to the river of Newry and bay of Carlingford, which they overhang in masses rising almost immediately from the water's edge. Towards the extremity of the peninsula and along that side bounding the bay of Dundalk the mountains leave a considerable margin of level land between them and the sea; indeed most of the coast is skirted by a broad sandy beach. Louth is the smallest county in Ireland.

Geology, Soil, Productions.—The level portion of the county south of the river of Dundalk belongs generally to the day-slate formation. Patches of carboniferous limestone occur in many parts, skirted by yellow sandstone. The mountainous region consists of a nucleus of granite supporting the day-slate and limestone of the surrounding fields and flanks. A great intrusion of crystalline greenstone trap occurs at the eastern extremity of the range. Iron and lead ore are the only minerals which have been observed, but nowhere in sufficient quantity to warrant mining operations. The soil of the southern division of the county is well adapted for every kind of grain crop. Farming in general is carried on in a superior manner. The fences are usually of quickset, and the lands well drained.

The manufacture of linen is prosecuted with some activity at Rensdale and Collon, where there are large bleach-grounds, but chiefly in Drogheda and its neighbourhood, where the trade is generally very brisk. The fisheries off the coast give occasional employment to several hundred persons.

Louth is divided into six baronies and sixty-four parishes. It returns two members to parliament. The county town is Dundalk.

History and Antiquities.—Louth, at the time of its invasion by the English, formed a portion of the territory of Orgial or Oriel. The eastern part of Orgial, constituting the present Louth, having been conquered by De Courcy between 1179 and 1180, was erected into a county by King John in 1210. Louth was not considered a portion of Leinster until the reign of Elizabeth. The forfeitures consequent on the rebellion of 1641, and the ensuing civil wars, extended over nearly the entire county.

The numerous antiquities which occur in Louth have been made the subject of a volume entitled "Louthiana," published at Dublin in 1758. Of the earthen mounds and intrenchments the most remarkable in the county is that of Castle-Grind at Ardee. Its perpendicular height is nearly 90 feet, the depth of the main trench between 30 and 40, the circumference at the top 140, and round the base upwards of 600 feet. There is another earthen in-

trenchment near Dundalk; stone circles at Ballirekan and Ballinahatry; a cromlech at Ballymascellan; round towers at Dromiskin and Monasterboyce; and remains of two others at Louth and Drogheda. Two beautiful stone crosses stand near the tower of Monasterboyce. The ruins of the abbey of Mellifont occupy a picturesque site on the banks of the Mattock River, near the Boyne. There are some very ancient ruins on the hill of Faughart, where Edward Bruce is said to be buried, connected with the old cell of St. Bridget. Of the various feudal buildings throughout the county the chief are the castle of Carlingford, erected by King John; Rohe's Castle, north-west of Dundalk; Torfeekan or Termonfeekin Castle, a residence of the archbishops of Armagh, inhabited last by Primate Usher; and Castletown, still kept in habitable order, on the south bank of the Castletown River, near Dundalk.

LOUTH, a market-town and municipal borough of England, in the county of and 26 miles E.S.E. of Lincoln, situated on the bank of the little river Ludd, 141 miles from London by the Great Northern Railway. The town is well-built and is beautifully placed at the foot of the Lincolnshire Wolds. Its most important building is the parish church of St. James, which was founded in the fourteenth century, and rebuilt in 1634. It has a spire 288 feet in height. There are two other churches, and chapels for Wesleyans, Primitive Methodists, Baptists, and Roman Catholics. There are also an endowed grammar-school, a town-hall, corn exchange, and market-hall. The chief trade is in agricultural produce, which is facilitated by a canal connected with the Humber, and constructed in 1761; but there are also iron foundries, carriage works, and a carpet and blanket factory.

The name of the town is a corruption of that of the river Ludd. There are still some remains of an abbey founded in 1139, in the vicinity. Louth was incorporated in the 5th of Edward VI., whose charter was confirmed by subsequent monarchs, and lastly by George IV. It is now governed by six aldermen and eighteen councillors, including the mayor. The population in 1881 was 10,691.

LOUVAIN (Dutch *Looren*), a town of Belgium, in the province of South Brabant, situated 15 miles by railway south-east of Malines, stands on the Dyle, and had a population of 36,813 in 1883. The city is very large in proportion to its present population. In the fourteenth century it was the capital of Brabant, and the largest and most commercial town in the Low Countries, and is said to have had 200,000 inhabitants. It was famous for its woollen manufactures, which gave employment to 150,000 weavers in the town and neighbourhood. Its chief manufacture at present is beer, but woollen goods and lace are also made. The town is not regularly built, but it contains many imposing structures, of which the most remarkable are the town-hall and the Church of St. Pierre, the tower of which, said to have been 533 feet high, fell in 1604. The ramparts surrounding the walls have been converted into promenades, nearly 6 miles in circuit. There is a celebrated university at Louvain, which was founded in 1426 by John, fourth duke of Brabant. In the sixteenth century it numbered forty-two colleges, and was attended by 6000 students. During the French occupation of Belgium the university was suppressed; but in 1817 it was re-established, and is again flourishing, chiefly as a theological seminary. The name of the town is derived from *Loo*, signifying a wooded height, and *reen*, a marsh—words which are also combined in *Vento*.

L'OUVERTURE, TOUSSAINT. See TOUSSAINT L'OUVERTURE.

LOUVET DE COUVRAY, JEAN BAPTISTE, one of the leaders of the Girondist party in the French Revolution, was born at Paris in 1760. He was one of the deputies in the Convention in 1792, already renowned, or perhaps rather notorious, for his romance "Les Amours

de Faublas" (1791), excellently written as to style, but rightly denounced by Carlyle as a "cloaca of a book," and his leaflets called "Sentinelles," which appeared as a sort of revolutionary journal during the times of the National Assembly (1789-90). He had the boldness to oppose Robespierre at the Jacobins, and again in the Convention; and once in October, 1792, when Robespierre dared any man to accuse him, Louvet publicly responded with a long list of crimes. His accusations were not backed up by the more timid members of his party, and first Danton fell and then the Girondists themselves before Robespierre. On 2nd June, 1793, Louvet was arrested with the rest, but escaped disguised as a national volunteer in company with ten others, Petion, Billaux, &c. Louvet has left an account of that "retreat of the eleven" which is very valuable. They reached Bordeaux, but were there obliged to separate. Nearly all the rest were either taken and guillotined, or shot themselves, or died of starvation; Louvet, after a thousand hair-breadth escapes, reached Paris and his wife, and got safely to Switzerland. After the overthrow of the Robespierre faction, Louvet was recalled to the Convention, and made a member of the Council of the Five Hundred (1795) and of the Institute (1796). He died in 1797.

LOUVIERS, a town of France, in the department of Eure, standing in a valley skirted by extensive woods, and watered by numerous branches of the Eure, 14 miles north from Evreux, and 17 miles S.S.E. of Rouen. It is a town of some commercial importance, and has tribunals of first instance and of commerce, a chamber of commerce, a conseil des prud'hommes, and 10,533 inhabitants. The old part of the town, which consists of a few broad streets communicating with each other by a multitude of narrow lanes, is entirely built of wood; the new part is built of brick and cut stone, and has some pretty streets. The Church of Notre Dame, the nave and choir of which date from 1218, is a very imposing edifice; the south portal, which was completed in 1496, is particularly admired for its bold projections and florid ornaments. The painted windows of this church are distinguished for the angular drawing and quaint designs that characterize an early period of art. The house of the Templars, a most curious specimen of the domestic architecture of the twelfth century, and the public library, are the other most striking objects in the town. Louviers is one of the chief seats of the cloth manufacture in France. It has been long famous for the finest description of cloths (for uniforms, &c.) Coarser cloths, kerseymeres, fancy goods for trousers, mantles, &c., are also made. There are also several woollen-yarn factories, large tan-yards, bleaching establishments, card factories, steam-engine and mill-work factories, dye-houses, brick-works, &c., and a brisk trade in corn, wood, charcoal, flax, wool, teasles, &c. The peace between Philip Augustus and Richard I., in 1196, was concluded at Louviers.

LOUVOIS, FRANÇOIS MICHEL LETELLIER, MARQUIS DE, an eminent French statesman, was born in Paris, 18th January, 1641. He early entered upon a political career, and having succeeded his father as chancellor and war minister, displayed a sagacity and an energy which secured him Louis XIV.'s entire confidence. From 1666 until his death, 1691, he retained in his hands the administration of the kingdom, directed the campaigns of Turenne and Condé, and contributed to the aggrandizement of France and the development of her resources. He entirely reorganized the French armies. He founded and repaired military schools, and erected the famous Hôtel des Invalides.

LOV'AT, SIMON FRASER, LORD, a famous Jacobite intriguer, was born at Urray, Ross-shire, in 1676. After completing his education at the University of Aberdeen he obtained a commission in the army, and on the

death of his cousin Hugh, Lord Lovat, in 1696, he claimed the headship of the Fraser clan. He attempted to carry off the daughter and heiress of his kinsman without success, but her mother, the dowager Lady Lovat, fell into his hands and was forced to marry him. Being outlawed for this offence he fled to St. Germain, where he affected zeal for the Jacobite cause, professed the Roman Catholic faith, and in 1703 was sent to Scotland with arms, credentials, and money, in order to promote a rising. He betrayed his trust, however, and revealed the plot to the Duke of Queensberry, and was sent back to France to act as a spy in the interests of the British government. Being discovered he was committed to the Bastille, where he remained four years. To obtain his release he offered to enter into holy orders, and being set at liberty he entered the Jesuit college of St. Omer. In 1715 he obtained the Fraser estates by an opportune espousal of the Hanoverian cause, and he contrived, in the years which followed this event, to materially advance his fortune. On the rebellion of 1745 he played false to the British government, by sending his son and clan to join the Pretender, while he continued himself to earnestly profess his loyalty. Being detected, he was compelled to flee, and after some wanderings was arrested on an island in Loch Morar and brought to London, where he was tried by his peers, condemned, and executed on Tower Hill, 9th April, 1747. His dauntless spirit, caustic wit, jesting, and buffoonery, were maintained by him to the last moment; and though in the eightieth year of his age, and so infirm that he had to be assisted to mount the scaffold, his spirits never flagged, and he met his fate with the most undaunted courage.

LOVE-APPLE, is the fruit of *Lycopersicon esculentum*, also called TOMATO.

LOVE-BIRD is a name given to some of the smaller short-tailed PARROTS (Psittacidae), from the remarkable mutual affection which they exhibit. In captivity they are generally kept in pairs, and it is a common belief that if one should die the other will pine away with grief at the loss of its companion. The genus to which the name most properly belongs is *Agapornis*, of which there are five species, all peculiar to Africa and Madagascar. The best known species (*Agapornis fucina*), which is a native of Southern Africa, is one of the smallest of its tribe, measuring only 5 inches in length. Its colour is a delicate but lively green; round the back of the neck there is a black collar, and beneath this a yellow band, which encircles the neck, and expands considerably on the breast; the short tail has the two middle feathers green, and the remainder scarlet at the base and green at the tip, the two colours being separated by a black band. Other small parrots are also called by dealers love-birds, such as the South American birds of the genus *Psittacula* and its allies, and small Australian parrots, common as cage-birds in this country. In the genera *Agapornis* and *Psittacula* the *furculum* or merrythought is absent.

LOVER, SAMUEL, an Irish artist, novelist, and song writer, was born in Dublin in 1797. He adopted the profession of miniature painter, and became secretary to the Royal Hibernian Society of Arts. In 1835 he went to London, where he practised his profession for a time, and numbered the Duke of Wellington and Lord Brougham among his sitters. His social gifts obtained for him admission into the best society, and he was an honoured guest at Lady Blessington's evening receptions. He had published a work entitled "Legends and Stories of Ireland" in 1832 (second series, 1834); and in 1839 he issued his "Songs and Ballads," which included the well-known "Rory O'More," "Molly Bawn," "The Angel's Whisper," "The May Dew," and the "Four-leaved Shamrock." A novel, entitled "Rory O'More," which he had written for Bentley in 1837, was afterwards successfully dramatized, and it had a long run at the Adelphi Theatre, London.

In 1842 he published the very popular and amusing "Handy Andy," which he illustrated with etchings on steel, and he followed this up with "Treasure Trove" in 1844, which he illustrated in a similar way. His eyesight and health having become seriously impaired, he abandoned writing for a time, and gave in London and elsewhere a series of "Irish Evenings," entertainments in which he displayed his powers as a musician and composer, and as a reader of his own works. These were very successful, and in 1846 he went to America, where his reception was most flattering. On his return to London in 1848 he gave his American experiences in an entertainment, entitled "Paddy's Portfolio," which was also very popular. He compiled the "Lyrics of Ireland" in 1858, and published "Metrical Tales and other Poems" in 1860. He died 6th July, 1868. Successful as a dramatist and painter his fame nevertheless rests chiefly on his songs and novels; the former are marked by genuine lyrical power and fully deserve their popularity, while the latter are replete with Irish humour, and happily illustrate the bright and genial side of the national character. His "Life and Unpublished Works," by Bayle Bernard, appeared in 1874.

LOWELL, one of the most populous cities of the United States, in Middlesex county, Massachusetts, is a manufacturing town, 25 miles N.N.W. of Boston, with which it communicates by canal and railway. It is situated on the south bank of the Merrimac, where the Concord River flows into it. The population in 1830 was 6174; in 1880 it had increased to 59,485. Lowell is the great seat of the cotton manufacture in the United States, for which there are upwards of 153 mills, employing 20,000 hands, of whom about two-thirds are females. It is often called the Manchester of America. Besides cotton factories, there are machine shops, manufactories of linen and woollen goods, carpets, bleaching-powder, gunpowder, paper, oil, starch, &c. The fall of the Pawtucket Canal—a descent of 32 feet, accomplished by four locks—affords immense water-power, by which most of the machinery of the mills, &c., is kept in motion. There are a city hall, court-house, jail, hospital, a large number of churches and schools, several charitable institutions, a literary and mechanics' institutes, with library; numerous banks, and incorporated companies; together with many private firms extensively engaged in the manufacture of cotton, linen, and woollen fabrics; bleacheries, powder-mills, and machine shops. Among the publications of this city was formerly a well-conducted magazine, the contributors to which were the young women of the factories. Two citizens of Lowell were the first to fall in the Civil War, and a monument has been erected to their memory. Lowell was constituted a town in 1826 and a city in 1836.

LOWESTOFT, a market and fishing town, seaport, and bathing-place of England, in the county of Suffolk, is situated on a height inclining gently to the sea, 25 miles S.E. of Norwich, and 117 miles from London by the Great Eastern Railway. It is the most easterly, and has the reputation of being the driest town in England. There are two lighthouses, one on the height or cliff (first built in 1576, and rebuilt in 1778), the other to the southward, nearer the beach. By means of these two lighthouse-vessels are safely directed through the sandbanks which render this coast especially dangerous. The old town lies to the north, crowning one of the rounded hills peculiar to this coast, with a church spire rising to the height of 182 feet. Between it and the modern town are the houses of traders and visitors; warehouses and building yards; the railway station and hotels; and patches of grass and trees—occupying all the slope down to the level of the new town, where two long piers inclose the port. An old channel by which Norwich and Lake Lothing used to communicate with the sea was reopened a few years ago, but not with the commercial success that was expected. The south pier, broad

and spacious, is much frequented by visitors. This, together with the grand esplanade, forms one of the finest marine promenades on the east coast of England. The north pier is chiefly devoted to the import of cattle from Germany, Denmark, and Holland, and to the fishery trade, which has good facilities of conveyance to London. These piers, 1300 feet long, are constructed of massive timbers braced together, the intervals being filled with blocks of stone. The harbour has a depth of 20 feet at low water. Lowestoft is the port of a rich agricultural district, and of the towns of Beccles and Bungay, situated up the river, while it shares with Yarmouth some of the Norwich trade. The manufactures of the town are rope and twine. There are also some sailmaking and boat-building establishments. A profitable and extensive fishery is carried on, employing several hundred hands. There are numerous curing-houses for herrings; soles and mackerel are also caught in large numbers. The parish church, a handsome and spacious building of the Perpendicular period, has a tower 70 feet and a spire 50 feet high. St. Margaret's, another church, was restored in 1871, at a cost of £6000. There are several chapels, a town-hall, market-place, and small theatre. The number of vessels registered as belonging to the port in 1885 was 460 (19,000 tons); the entries and clearances each average 600 (85,000 tons) per annum. The population in 1881 was 19,690.

On the 3rd of June, 1665, a sanguinary naval engagement was fought off the coast between the English and Dutch fleets, the former commanded by the Duke of York, afterwards James II., and the latter by Admiral Opdam, who fell in the battle.

LOX'OCASE is a variety of orthoclase felspar; it contains a high percentage of soda, is of a grayish colour, and has a pearly or greasy lustre.

LOYOLA, IGNATIUS. *Don Iñigo Lopez de Recalde*, more generally known under the name of Loyola, was the youngest child of Don Beltram, lord of Oñez and Loyola. He was born in 1491, at the Castle of Loyola, in Guipuscoa. In early youth he was attached to the court of Ferdinand and Isabella in the quality of a page, and afterwards distinguished himself as a soldier. In his thirtieth year, while assisting in the defence of Pampluna against the French, he was severely wounded. A long and painful confinement was the result. To relieve its weariness he was furnished with works of mystical devotion and the lives of saints. He has graphically described the various scenes through which he passed in his introduction to a religious life in his "Spiritual Exercises." From this time all his desires were directed to one great object—an entire devotion to the service of God. He resolved upon retiring to a Benedictine monastery at Mount Serrat, in order to prepare himself for a pilgrimage to the Holy Land. On his return he passed the vigil of the Annunciation, 21st March, 1522, in the church of the Holy Virgin, at Mount Serrat; on its altar he hung up his arms, the trophies of his worldly triumphs, and vowed obedience to the commands of God's church. He determined to perform barefoot his intended pilgrimage, and in the coarse raiment of a beggar. On leaving Mount Serrat, he went to the hospital of the Dominican convent at Manresa, where his deeds of charity soon acquired for him celebrity in that town and the admiration of the multitude, to avoid which he retired to a cavern at a short distance from Manresa, where he redoubled the severity of his penances, and was one day found inanimate from sheer exhaustion at the door of his cell. After residing ten months at Manresa, he left for Barcelona, whence he embarked for Rome. In that city he obtained the blessing of the Pope, Adrian VI., upon his enterprise, and resumed his journey alone, fasting daily and begging alms. From Cyprus he embarked with some pilgrims for the Holy

Land, and reached Jerusalem 4th September, 1523. He was refused permission of residence from the primate of the Church of Rome at Jerusalem, and after numerous adventures he returned to Venice in January, 1524, and from thence he went to Barcelona. In this town he determined upon making some stay in order to study, and at the age of thirty-three he began to apply himself to the rudiments of grammar. He continued studying at Barcelona till the attempts on his part to reform some irregularities in a convent of nuns exposed him to the vengeance of those who had partaken in their disorders. He then retired to the University of Alcalá, but a religious address which he delivered to the students was the occasion of his dismissal from that university. In 1527 he went to Salamanca, but there he fell under the displeasure of the Inquisition, who punished him by a severe confinement, and dismissed him from their city. He next repaired to Paris, where he arrived in February, 1528. He applied himself to the studies of the university, humbly placed himself in the class of the least advanced scholars, and besought their teacher to treat him as one of them. Two students shared his rooms, Peter Favre and Francis Xavier of Navarre. The three companions formed the closest intimacy, and their little society was afterwards extended by the admission of Laynez, Salmeron, Nicholas Bobadilla, Rodriguez, and Claude le Jay. On 15th August, 1534, they assembled at the church of Montmartre, where they took the solemn vows of chastity, absolute poverty, devotion to the care of Christians and to the conversion of infidels. The further history of the religious community thus established has been told under the head of JESUITS.

On 27th September, 1540, Paul III. sanctioned, under some limitations, the establishment of the order, and finally, in 1543, made the sanction unconditional. Loyola was chosen president. He remained at Rome as the centre from which he was to direct the movements of the society. His time was spent in revising its constitutions and in works of charity. He founded an asylum for the protection of Jews who had become proselytes to Christianity, and a penitentiary where the victims of seduction might reform their lives. Loyola died 31st July, 1556.

The memory of Ignatius was consecrated by beatification in 1609, and he was canonized as a saint by Pope Gregory XV. in 1622. His festival is celebrated on 31st July.

LOZENGES. In such cases as ulcerated or inflamed sore throat, chronic coughs, &c., lozenges are often employed by medical men, so that the substances of which they are composed may only pass gradually into the stomach, and act as long as possible on the pharynx and laryngeal opening. They are generally composed of demulcent materials—such as farinaceous matter, sugar, isinglass, and gum—as such a combination delays the solution of the different products the longest possible time. Lozenges differ from drops in the fact that in the latter the sugar is first rendered fluid by means of heat, while no heat is employed in mixing the ingredients of lozenges.

LOZÈRE, a department in France, formed chiefly out of the old district of Gévaudan, is bounded N. by Cantal and Haute-Loire, E. by Aude, S. by Gard, and W. by Aveyron. It greatest length is 60 miles, and its mean width 39 miles. The area is 1996 square miles, and the population in 1881 was 143,565.

Surface.—It is covered by the Cévennes Mountains in the south-east, which rise in Mont Aigoul to the height of 5100 feet above the sea-level; by the Margeride chain in the east and north-east; by the Aubrac Mountains in the centre and west; and in the south-west by high plains, called *causses*, many of which are of great fertility. The melting of the snow that lies on these mountains for several months in the year gives rise to a great number of rivers, which drain the three slopes formed by the disposition of the masses before named. The north-eastern slope

belongs to the basin of the Loire, and is drained by the ALLIER and some of its feeders; the south-eastern slope makes part of the basin of the Rhône, and is drained by Gardon-d'Alais and the Gardon-d'Anduze; and the western slope, which is included in the basin of the Garonne, is drained by the river Tarn, the Lot, and the Truyère.

Climate.—The mountains being snow-clad during a great part of the year, renders the climate severe for the latitude; winter lasts about four months in the southern part of the Cévennes, and is prolonged to six months in the north of the department; the spring is very rainy, and violent storms are frequent in summer.

Products, &c.—The nature of the soil presents great obstacles to the labours of the farmer; yet in most instances the land that is capable of cultivation is well tilled. The chief crops raised in the north of the department are rye, some barley, oats, and hay; in the *causses* wheat, barley, oats, fruits, &c., are grown; and in the Cévennes the chestnut and the potato are the chief support of the population. The vine is cultivated in some favourable situations; but the quantity of wine produced does not suffice for the consumption, and the same may be said for the cereal productions of the department. In the south-eastern slopes the mulberry is grown for the production of silk. The mountain pastures are extensive, and of excellent quality; great numbers of fine-woolled sheep are reared. Horses are not numerous; but mules and horned cattle are bred in large numbers. Among the wild animals are wolves, badgers, and great numbers of hares and rabbits. Medicinal plants, and others used in tanning and dyeing, are abundant. The forest timber is composed of oak, beech, fir, chestnut, &c. Iron, lead, antimony, silver, and copper are found. In the Gardon and in the Céze particles of gold are found after heavy rains. Marble, porphyry, granite, gypsum, &c., are also met with. Mineral springs are numerous.

The manufactures are unimportant, and are nearly all for home use. The commerce of the department, owing to the want of water communication and good roadways, is confined to articles of mere necessity, and is altogether insignificant. The department is divided into the three arrondissements of Mende, Florac, and Marvejols. The capital of the department is MENDÉ.

LUALABA. See AFRICA.

LUBECK, a small territory and free city of Germany. The territory is bounded east by Mecklenburg-Strelitz, west by Oldenburg and Holstein, and south by Lauenburg; the northern part, between Holstein and Mecklenburg, extends to the Baltic. The former territorial possessions were very scattered; some detached portions were in Holstein, some in Lauenburg, and others in Mecklenburg. By the decision of the Diet in 1803, modified in 1804 by a treaty with Oldenburg, Lubeck obtained, in exchange for many of its distant districts, a continuous tract on the Trave. The city is situated on a low ridge of ground between the rivers Trave and Wakenitz, 36 miles north-east of Hamburg, and 10 miles from Lubeck Bay in the Baltic. The territory is 116 square miles in extent, with a population of 63,571. The population of the city proper is 51,055. Lubeck is no longer a fortified town; the old ramparts are converted into public walks, and the city is very clean and cheerful. The interior is intersected by several broad and straight streets. The houses are built of stone. A great number of them are in the old-fashioned style, with the gable ends towards the street. Besides the cathedral, which contains valuable paintings and remains of antiquity, there are seven churches, of which that of St. Mary (Marienkirche) is celebrated as one of the finest Gothic churches in Northern Germany. It was completed in 1304, and has three naves and two towers, 382 feet high. Lubeck has a gymnasium, several charitable institutions, a school of design, a Roman Catholic chapel, and a Calvinist

church. There are also an exchange, an arsenal, a mint, a valuable public library, and an operatic theatre. The senate-house, an ancient Gothic building, contains the hall where the deputies of the Hanseatic League formerly met.

Throughout the territory of Lübeck the soil is fertile, the principal occupation of the inhabitants being the rearing of live stock. The Stecknitz and the Trave are the only rivers of any importance. The principal exports are corn, cattle, wool, fish, iron, and timber; the imports comprise wines, silks, cottons, hardwares, and other manufactured goods, colonial products, dye-stuffs, &c. The city has an extensive commission and transit trade, and fairs for wool, cattle, and horses. There are manufactures of cigars, soap, playing cards, paper, linen and cotton stuffs; iron, copper, and brass works.

Lübeck communicates with Hamburg by railway and the Trave and Stecknitz Canal, and its trade has greatly revived. About 2000 vessels arrive and depart annually. The principal foreign trade is with Russia, Sweden, and Denmark; sea-going vessels can now come up to the town, where they enter a basin lined with quays; the largest ships discharge their cargoes by lighters at Trave-münde, which is situated at the entrance of the Trave into the Baltic, and has a fine secure harbour. Steamers ply to St. Petersburg, Copenhagen, Hamburg, Amsterdam, Stockholm, Hull, &c. Small steamers convey passengers, &c., up the river to Lübeck daily.

It is uncertain when or by whom this city was founded, but no doubt it existed A.D. 1140. Early in the thirteenth century the Emperor Frederick II. made it one of the free towns of the empire; and from 1260 to 1669 Lübeck was the repository of the archives of the powerful association of cities included in the Hanseatic League, and the station of the confederated fleet. The dissolution of the League marked the epoch of the decline of Lübeck. After the battle of Jena Blücher threw himself into Lübeck, which, after a severe engagement, was taken by the French and sacked. In 1810 it was made the capital of an arrondissement in the department of Bouches de l'Elbe; but was restored to rank as a free city by the Congress of Vienna in 1815. It is now included in the German Empire, but, like Bremen and Hamburg, retains many of its former privileges. The government was formerly purely aristocratic, but the city and state are now governed according to the constitution of 7th April, 1871. The main features of this charter are two representative bodies, the Senate, exercising the executive, and the *Bürgerschaft*, or House of Burgesses, exercising the legislative authority. The Senate is composed of fourteen members, elected for life, and presided over by two burgomasters, who hold office for two years each, and retire in rotation. There are 120 members in the House of Burgesses, chosen by all citizens who are members of any of the twelve colleges or guilds of the town. A committee of thirty burgesses has the duty of representing the legislative assembly in the intervals of the ordinary sessions. A very considerable banking business is done in Lübeck, and in 1876 a branch of the new Imperial German Bank was established here. There are very good railway facilities, and in 1879 a railway bridge across the Elbe near Honsdorf, in Lauenburg, was completed, which superseded the former inconvenient steam ferry.

LUBLIN, the capital of the Russian province of Lublin, and the town third in importance of Russian Poland, is situated 60 miles south-east of Warsaw, on an eminence above the river Bistriz, and has 34,972 inhabitants. The city, which was formerly strongly defended by walls and ditches, is divided into an upper and lower town, of which the latter is chiefly inhabited by Jews. It has a dilapidated castle on a hill, and is the seat of a bishop and court of appeal. The most considerable buildings are the town-hall and the numerous churches;

there are also a Piarist college, a synagogue, the Sobieski palace, a gymnasium, several hospitals and charitable institutions. The town has three annual fairs, each lasting a month, and a considerable trade in woollen cloths, wine, corn, &c.

LU'CAN (*Marcus Annæus Lucanus*), the Latin poet, was born at Corduba (the modern Cordova) in Spain, A.D. 38. He was the nephew of Seneca, and was carefully educated at Rome. His poetry recommended him to the notice of Nero, who bestowed upon him the dignity of quaestor and augur. Lucan entered into a conspiracy with Piso and others to assassinate Nero. This conspiracy was detected, and the poet being condemned to death, opened his veins A.D. 65. Lucan wrote many poems, but the only one extant is the "*Pharsalia*," which celebrates the civil war between Cæsar and Pompey, and gives (in ten books) an account of its incidents from its commencement to Cæsar's visit to Cleopatra in Egypt. In the early books a rather fulsome flattery of Nero is apparent; but it is curious to notice how this gives way before a growing republicanism, until the last books we have contain glowing eulogies on freedom, heightened by invectives against tyranny.

LU'CAN IDÆ. See STAG-BEETLES.

LUC'CA, a town of Northern Italy, the capital of the province of the same name, is situated in a rich plain watered by the Serchio, and surrounded by mountains: it is 12 miles from the sea, about 10 north-east of Pisa, and contained 70,399 inhabitants in 1881. It is surrounded by ramparts, which are planted with trees, and form a very pleasant promenade. The town is well built, and has a good supply of water; the streets are well paved and clean. Lucca, like most other Italian cities, is rich in churches, mostly built of Carrara marble; the cathedral, which belongs to the eleventh century, is adorned with good paintings, and with statues and monuments by the native sculptor Civitali. The archiepiscopal archives and those of the chapter contain a vast mass of historical documents, parchments, and MSS., some as old as the seventh century. The other remarkable churches of Lucca are those of San Frediano, San Francesco, and San Michele. The ducal palace (unfinished) is a vast building; it has a gallery of valuable paintings by the great masters, and a library of 50,000 volumes. The other remarkable structures are—the town-house, the aqueduct, on 459 arches, for the conveyance of water from Monte Pisano; theatre, many public fountains, the public library, and several of the mansions of the nobles. The Academy of Letters and Sciences of Lucca, instituted in 1817, which consists of thirty-six members, holds its meetings once a month, and has published several volumes of memoirs. Lucca also contains a seminary for noble ladies (founded by the sister of Napoleon I.), a botanic garden, and many benevolent institutions. It is the first place in Italy where silk was manufactured, and still has manufactures of this article, as well as of woollen fabrics, paper, and the Oriental fez for export to the Levant. An active trade is carried on in olive oil, which is esteemed the best in Italy. It is an archbishop's see. In the twelfth century it became a free city. In 1805 Napoleon I. erected it into a principality for his sister Elizabeth's husband, Bacciochi. Lucca (*Lurna*) is mentioned in ancient history as a town belonging to the Etruscans, after they had conquered the country between the Arno and the Maera, and taken it from the Ligurians. Under the Romans it was a *municipium*, and was often the headquarters of Julius Cæsar. Here he made the famous alliance with Crassus and Pompey. There are still remains of a theatre and an amphitheatre.

Near the town are the reputed baths of Nero; and 11 miles to the north, in the valley of the Serchio, are the famous mineral baths of Lucca, the water from which is

exported to all parts of Italy. Its temperature varies from 96° to 136° Fahr.

LUCERNARIA is a genus of HYDROZOA belonging to the subclass Scyphomedusæ, and forming the type of the order Lucernaria. The Lucernariae are interesting in exhibiting a form intermediate between the fixed elongated HYDRA and the free-swimming bell-shaped MEDUSA. They swim by contractions and expansions of the disc, like ordinary jelly-fish; and they can also fix themselves to seaweeds and rocks, like the polyps, by a delicate peduncle terminating in an adhesive disc, as they are represented in the annexed cut. Sometimes also they creep on their foot-stalk, like a sea-anemone. The margin of the disc is furnished with eight knobs covered with tentacles. The mouth is situated at the end of the mouth-stalk (*manubrium*),



Lucernaria auricula.

which hangs down in the centre of the bell like a clapper. There are four radial canals, which are parts of the digestive cavity, and communicate with the mouth. The genital products are passed out of the mouth. In some species between each cluster of tentacles are modified tentacles, acting as claspers to some extent. The Lucernariae feed on minute infusorians, &c., which they seize by means of the tentacles. Three species of Lucernaria are found on British coasts. The species figured, *Lucernaria auricula*, an American species, is of a beautiful greenish colour, faintly tinged with red; the figure shows the natural size. The Lucernariae are very beautiful objects in aquaria.

LUCERNE (*Medicago sativa*) is super-eminent as an artificial grass in temperate climates, and a most valuable plant for feeding cattle. It was in high repute among the ancients. The authors of "De Re Rustica" speak of it with enthusiasm, and all over the continent of Europe, wherever husbandry has made any progress, it is in high reputation. Lucerne is a plant which will not bear extreme frost nor superabundant moisture, and its cultivation is therefore restricted to mild climates and dry soils; but where it thrives its growth is so rapid and luxuriant that no other known plant can be compared to it. In good deep loams lucerne is the most profitable of all green crops; when properly managed, the quantity of cattle which can be kept in good condition on an acre of lucerne, during the whole season, exceeds belief. It is no sooner mown than it pushes out fresh shoots, and wonderful as the growth of clover sometimes is in a field which has been lately mown, that of lucerne is far more rapid.

Lucerne, sown in a soil suited to it, will last for many years, shooting its roots downward for nourishment till they are altogether out of the reach of drought. In the driest and most sultry weather, when every blade of grass droops for want of moisture, lucerne holds up its stem, fresh and green, as in a genial spring. The only enemies of this plant are a wet subsoil and a foul surface. The first is often incurable; the latter can be avoided by good cultivation.

Another *Medicago* (*hupulina*), Black Medick or Black Nonsuch, is a native of Europe in meadows, pastures, and waste ground, and is plentiful in Great Britain. It affords excellent fodder for sheep, and must be treated in the same way as lucerne.

LUCERNE or **LUZERN**, a canton of Switzerland, bounded N. by Aargau, E. by Schwytz and Zug, S. by

Unterwalden, and W. by Bern. Its greatest length from north to south is 33 miles, and its greatest breadth 27. Its area is variously estimated at from 500 to 600 square miles, the great difference in the estimates being due to the irregularity of the boundaries of the canton. The population in 1880 was 131,806, the Roman Catholics being in a great majority.

The slope of the valleys is towards the north-east and north-west. The southern part of the canton belongs to the basin of the Reuss, which issues out of the Lake of Lucerne, or Vierwaldstatter See, at the town of Lucerne, and flows N.E. into Aargau. Below Lucerne the Reuss is joined by the Wald-Emme, which rises on the south-west extremity of the canton. North-east of the Sempach Lake, which is in the centre of the canton, is another lake, called the Baldeg Lake. The only mountains in the canton are at the southern extremity, on the borders of Unterwalden and the Bernese Oberland. None of them attain the limits of perpetual snow. The highest is Mont Pilatus, south-west of the town of Lucerne, always cloud-capped, and a conspicuous feature in its landscape. It is a mountain group nearly 30 miles in length, extending along the borders of Lucerne and Unterwalden, and having seven peaks, of which the Tomlishorn (7290 feet) and the Esel (6678 feet) are the highest. The view from these summits is very extensive. The soil of Lucerne is fertile; it is one of the very few cantons of Switzerland which produces more corn than it consumes. Fruit trees are also abundant; the vine is cultivated in some favourable situations. The rearing of cattle is the principal branch of industry in a great part of the canton. In some districts there are manufactories of linen and cotton goods. The trade between Switzerland and Italy by the St. Gothard employs a number of people, and all the goods pass through Lucerne and its lake. A steamer runs from end to end of Lake Lucerne twice a day in the summer.

German is the language spoken. Lucerne is in the diocese of the Bishop of Basel, who resides at Solure, and it is the chief of the Roman Catholic cantons.

Lucerne was the leading canton in the Roman Catholic league of the Sonderbund, which attempted to oppose by force, in 1846, the expulsion of the Jesuits from Switzerland.

LUCERN, the capital of the above canton, is situated at the western extremity of the Lake of Lucerne, and is divided into two unequal parts by the Reuss, which issues out of the lake. The larger part, which is on the right bank, is built on the slope of a hill; there are still remains of the old walls flanked by watch-towers. The interior of the town presents streets narrow, uneven, and ill-paved. The remarkable buildings are—the cathedral, several other churches, convents, the town-house, the college of the Jesuits, the arsenal, with ancient armour, and the two remaining covered wooden bridges, which are the chief curiosities of the town, being adorned with ancient paintings; the valuable town and cantonal libraries, a museum of antiquities, and the Gletschergarten or Glacier Garden, which contains some very interesting relics of the ice-period, with eighteen *riesentöpfe*, or glacier mills, and well-preserved *gletscherschliff*, or rocks worn by the action of the ice, &c., discovered in 1872. The erosions known as glacier mills are caused by the rapid whirling of a stone by a stream from the melting ice, which in the course of ages scoops out ever deeper and wider these cavities in the rock. They range from the tiny erosion just commenced to the grand basin, 20 feet in diameter, and more than 30 feet deep, on whose smooth walls are clearly marked the spiral windings caused by the whirling of the stone perpetually from east to west. In addition to the covered wooden bridges the river is crossed by two modern constructions, and beside the lake is a fine quay. It is at Lucerne that there is the famous lion, executed after a model by the

celebrated Danish sculptor Thorwaldsen in 1821, to the memory of twenty-six officers and about 760 soldiers of the Swiss Guard who fell in the defence of the Tuileries on 10th August, 1792. The dying lion, reclining in a grotto, transfixed by a broken lance, and sheltering the Bourbon lily with its paw, is hewn out of the natural sandstone rock.

Lucerne is one of the three seats of the Swiss diet, and has manufactures of silk and cotton fabrics and carriages, and a large weekly corn market. The city of Lucerne was given by Pippin in 768 to the abbots of Murbach and Alsace, to whom it belonged till towards the end of the thirteenth century, when it was sold to the house of Hapsburg. But in 1332 the citizens, impatient of the Austrian yoke, rebelled, and joined the three primitive cantons of the Swiss confederacy. In less than thirty years they conquered the territory which now forms the canton. The town was taken by the French, 1st May, 1798, and was for eight months the capital of the Helvetic government. The forces of the Sonderbund were defeated near Lucerne by the Federal army of the Swiss diet, under the command of General Dufour, on the 24th November, 1847. The population of the town in 1880 was 17,850.

LUCERNE, LAKE OF, also called the "Lake of the Four Forest Cantons" (*Vierwaldstätter See*), from its being surrounded by the cantons of Lucerne, Schwytz, Uri, and Unterwalden, is the largest and finest basin of water in central Switzerland. Elevation above the sea-level, 1437 feet; length from north to south, about 25 miles; breadth from north-east to south-west, about 9 miles; depth, near Lucerne, 300 feet, and towards the east and south-east, 600 to 900 feet, and the greatest depth yet reached is 1040 feet. The lake is nearly cruciform in shape, the Bay of Lucerne forming the head, those of Küssnacht and Alpnach the arms, and the Bay of Buochs and Lake of Uri the foot. The Röss traverses it in its entire length, emerging from it near its western extremity. Its banks exhibit every gradation of scenery, from a gently rising and fertile country at its western end, to rugged and savage sublimity on the Lake of Uri. Its eastern and southern parts are surrounded by mountains rising to many thousand feet above the sea, the chief of which are Mounts Pilate and Righi. Like all mountain lakes it is subject to violent tempests; and in consequence of the different positions of its different arms, and the influence of the surrounding mountains, different winds seem to prevail in different parts of its extent at the same time. Its shores abound in localities memorable in early Swiss history. At the northern extremity of what is called the Lake of Uri is the little town of Brunnen, where in 1315 a treaty was entered into by Uri, Schwytz, and Unterwalden, which gave birth to the Helvetic confederacy.

The scenery which borders upon it presents every

variety of landscape, and the blue waters that wash a strand of simple beauty alternate with billows dark with the shadows of the rocks they chafe, which rise above them to a stupendous height, and with a steepness that is even terrible, especially in the little Bay of Uri, sacred to a patriot's memory.

"That sacred lake withdrawn among the hills,
Its depth of waters flanked, as with a wall
Built by the giant race before the flood;
Where not a cross or chapel but inspires
Holy delight, lifting our thoughts to God
From godlike men—
That in the desert sowed the seeds of life,
Training a band of small republics there,
Which still exist, the envy of the world,
Who would not land in each and tread the ground—
Land where Tell leaped ashore?"

It seems now to be proved that, as in the case of other Swiss lakes, that of Lucerne lies in a rock basin produced by the erosive action of glaciers.

LUCHON. See BAGNÈRES-DE-LUCHON.

LUCIAN (*Loukianos*), a Greek writer, was born at Samosata, a city on the west bank of the Euphrates, in the Syrian province of Kommagene. He was born about the latter end of Trajan's reign, lived under both the Antonines, and died in the reign of Aurelius' son Commodus, or shortly afterwards. His parents, who were in humble circumstances, placed him with his maternal uncle, a sculptor; but he soon quitted this trade and applied himself to the study of the law. He afterwards practised at the bar in Syria and Greece, eventually settled in Gaul as a teacher of rhetoric, and acquired considerable wealth. The greater part, if not all of his dialogues appear to have been written after this time. During the remainder of his life he travelled about and visited successively Macedonia, Cappadocia, Paphlagonia, and Bithynia. The greater part of his time, however, was passed in Athens. Towards the latter part of his life he held a lucrative public office in Egypt, which was bestowed upon him by the Emperor Commodus.

The dialogues of Lucian are written in pure and elegant Greek. He had great wit, and the flow of his language is easy and natural. He exposed fanaticism and imposture, the frauds of the priesthood, the folly and absurdity of the superstitious, and especially the solemn nonsense and the immoral lives of the philosophical charlatans of his age. He is among the most amusing of the ancients, but if one goes beneath the surface the constant burlesque of all that was then held sacred by pagans becomes cynical and rather depressing. The best editions of Lucian's works are by Hemsterhuis, who only edited part of the first volume, and Reitz (four vols. 8vo), by Lelmann (Leipzig, nine vols. 8vo); the best translation of Lucian in English is by Tooke (London, two vols. 4to, 1820), but an excellent general idea will be obtained from Collins' small work on "Lucian" in the *Ancient Classics Series* (1874).

END OF VOL. VIII.

